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INVESTIGATION OF THE EFFECT OF LOW THRUST LEVELS ON THE BASE PRESSURE OF A CYLINDRICAL BODY AT SUPERSONIC SPEEDS

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U.S. ARMY MISSILE COMMAND
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DA Project No. 1M262301A206
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Abstract

Results of supersonic wind tunnel tests are presented which show the effects of varying nozzle geometry, location, and supply pressure on the base pressure of a cylindrical body at zero angle of attack. The purpose of the tests was to investigate the parametric influences in the regions where base pressure is near a minimum, which occurs in the lower range of thrust levels. A bibliography of related experimental results is also included.

Contents

Illustrations

Illustrations (Concluded)

1. Introduction

The base drag on a missile with thrust is generally greatest at low thrust levels and is significantly influenced by the various rocket nozzle geometric parameters. For clarifying the influences of the nozzle geometric parameters, a series of supersonic wind tunnel tests has been conducted with a cylindrical body by using cold, dry air to simulate the rocket exhaust. Nozzle parameters varied were diameter, expansion ratio and expansion angle, longitudinal position, and thrust level.

The basic results of the tests (base pressure variation with nozzle chamber pressure) are presented in plotted form without detailed analysis, but they are arranged to illustrate major parametric influences. These results are repeated in tabular form, and additional nozzle flow parameters and test condition information are shown in the appendix.

2. Apparatus

The model was mounted to the tunnel topwall and aligned with the tunnel flow by means of a fixed swept strut which also provided routing of the instrumentation lines and cold air supply used to simulate the exhaust flow. The external shape of the model was defined by a 4-caliber tangent-ogive nose plus a cylindrical body which was 2 calibers long. Details of the model are shown in Figure 1.

Two types of base configurations were used during these tests. One model configuration, designated as the "open base" configuration, contained an active nozzle mounted concentrically in a larger inactive nozzle. This configuration presented considerable base area which was not adjacent to the region where the exhaust was exiting from the model. Also, this configuration was constructed so that the exit plane of the active nozzle was located at positions other than the plane of the model base. This configuration was made by combining the nozzles (Figure 1b) and the "open base" body (Figure 1a).

The model configurations designated as "closed base" were made by installing the nozzles, including sonic (Figure 1c), conical supersonic (Figure 1d), and contoured supersonic (Figure 1e) into the body identified in Figure 1a as the "closed base" body.

Tunnel No. 1 of the Ballistic Research Laboratories is a continuous flow, supersonic wind tunnel capable of operating over the Mach number range of

1.20 to 5.0. The test section dimensions are 13 by 15 inches. The minimum test Mach number for this model in this facility is 2.5. Complete details of this facility are given by Baughman.[1]

The estimated range of inaccuracy of all data presented herein is as follows:

Mach number, ±0.008
Local model pressure, ±0.100 psi
Air supply pressure,

0 to 15 psi range ±0.030 psi
0 to 100 psi range ±0.200 psi
0 to 300 psi range ±0.600 psi

3. Presentation of Data

The information presented here consists of:

a) Justification for direct comparison between results obtained with open and closed base configurations

b) Observations on the insignificant influence of Reynolds number over the test Reynolds number range

c) Plotted basic results arranged to illustrate major parameteric influences

d) Tabulated results.

A detailed listing of the test condition, test configurations, base pressure, and base pressure coefficient variation with nozzle chamber pressure, thrust coefficient (CT), and momentum flux ratio (RMF) is presented in the appendix. The values of CT and RMF have been calculated by using measured values, nozzle physical dimensions, and one-dimensional flow relationships. An index to the tabulated data and symbol notation as used in this tabulation are also shown in the appendix.

Two cylindrical body configurations were tested: a closed base configuration and an open base configuration, which simulated an inactive large boost

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[1] Baughman, L. E., and Kochendorfer, F. D., "Jet Effects on Base Pressures of Conical Aft bodies at Mach 1.91 and 3.12," NACA RM E57E06, August 1957

nozzle surrounding an active small sustainer nozzle (Figure 1a). A comparison of results from each of the bodies with identical nozzles is shown in Figure 2. This comparison indicates that effects due to base configuration difference are very slight. On the basis of this comparison, no further reference to the base difference will be made. Excellent repeatability of data acquired in separate test entries is also shown in Figure 2.

A group of nozzles were tested at a Reynolds number lower than the nominal value to extend the range of thrust level. The results are presented in Figure 5 together with results obtained at the nominal Reynolds number. In these results there is a slight but consistent shift in the base pressure ratio at comparable chamber pressure ratios, although different chamber pressures were used to produce the comparable ones. To investigate this shift in base pressure, further testing was conducted both over a greater Reynolds number range and without the standard boundary layer transition strip on the nose. These data, presented in Figure 3, show no consistent trends with Reynolds number over the range in question $\left(R_N \approx 0.20 \text{ to } 0.50 \text{ million per inch}\right)$. On the basis of this observation, it is felt that the shift is due to data acquisition errors and is not a Reynolds number effect.

The basic results from the test are presented in Figures 4 through 19. The nozzle configuration variable for each group of data is shown in Table I.

TABLE I. NOZZLE CONFIGURATION VARIABLES

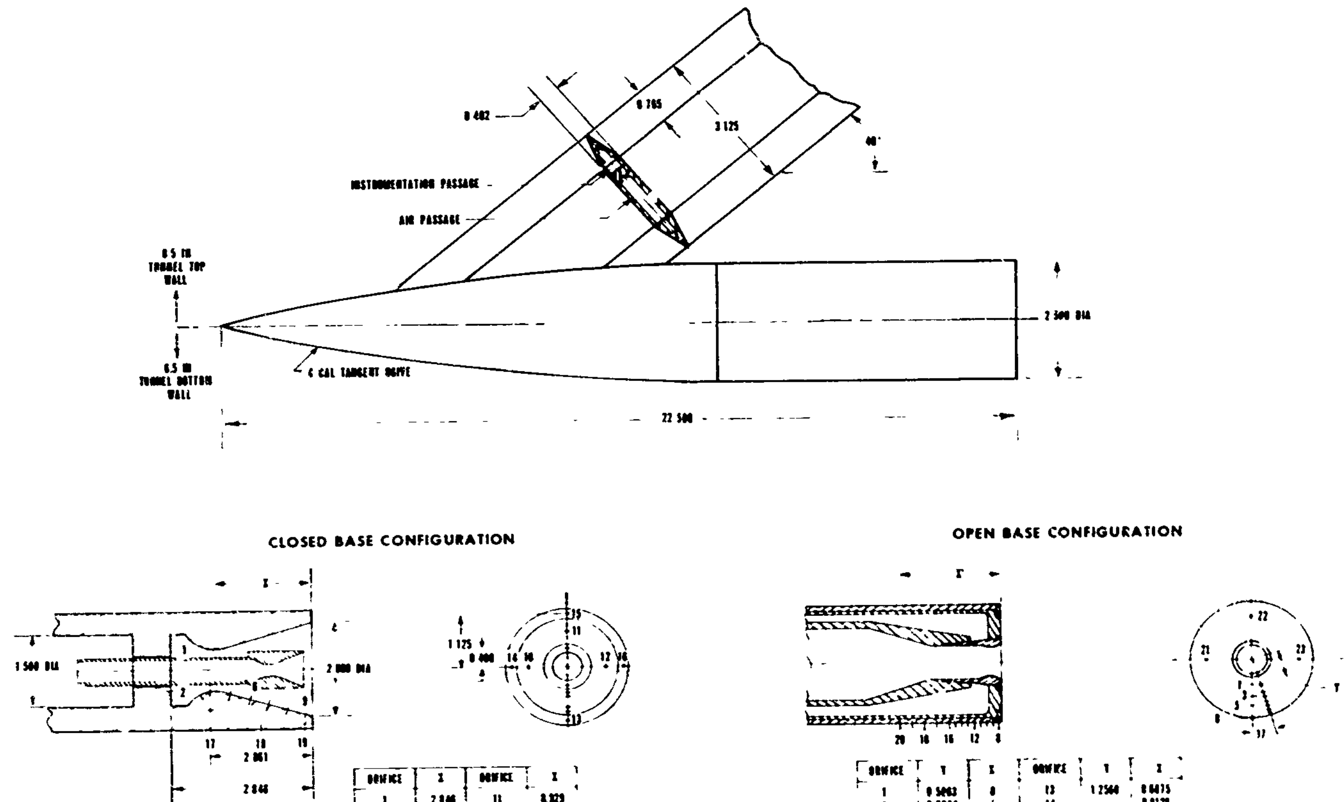
Configuration Variable	Configuration Constants	Figure No.
Nozzle Mach No.	$D^*/DB = 0.141, \theta_j = 0$ deg	4
	$\theta_j = 0$ deg, $D_j/D_B = 0.20$	5
	$\theta_j = 20$ deg, $D_j/D_B = 0.20$	6
Nozzle Expansion Angle	$M_j = 1.78$, $D_j/D_B = 0.20$	7
	$M_j = 2.20$, $D_j/D_B = 0.20$	8
	$M_j = 2.70$, $D_j/D_B = 0.20$	9
	$M_j = 3.20$, $D_j/D_B = 0.20$	10

TABLE I. NOZZLE CONFIGURATION VARIABLES (Concluded)

Configuration Variable	Configuration Constants	Figure No.
Nozzle Exit Diameter	$M_j = 1.0$, $\theta_j = 0$	11
	$M_j = 1.78$, $\theta_j = 0$	12
	$M_j = 1.78$, $\theta_j = 20$	13
	$M_j = 2.70$, $\theta_j = 0$	14
	$M_j = 2.70$, $\theta_j = 20$ deg	15
	$M_j = 3.20$, $\theta_j = 0$ deg	16
Nozzle Exit Position	Nozzle, $D_j/D_B = 0.1$	17
	Nozzle, $D_j/D_B = 0.2$	18
	Nozzle, $D_j/D_B = 0.3$	19

The symbols used in these figures are identified in the following list, while those used with the tabulated data are given in the preface of that section.

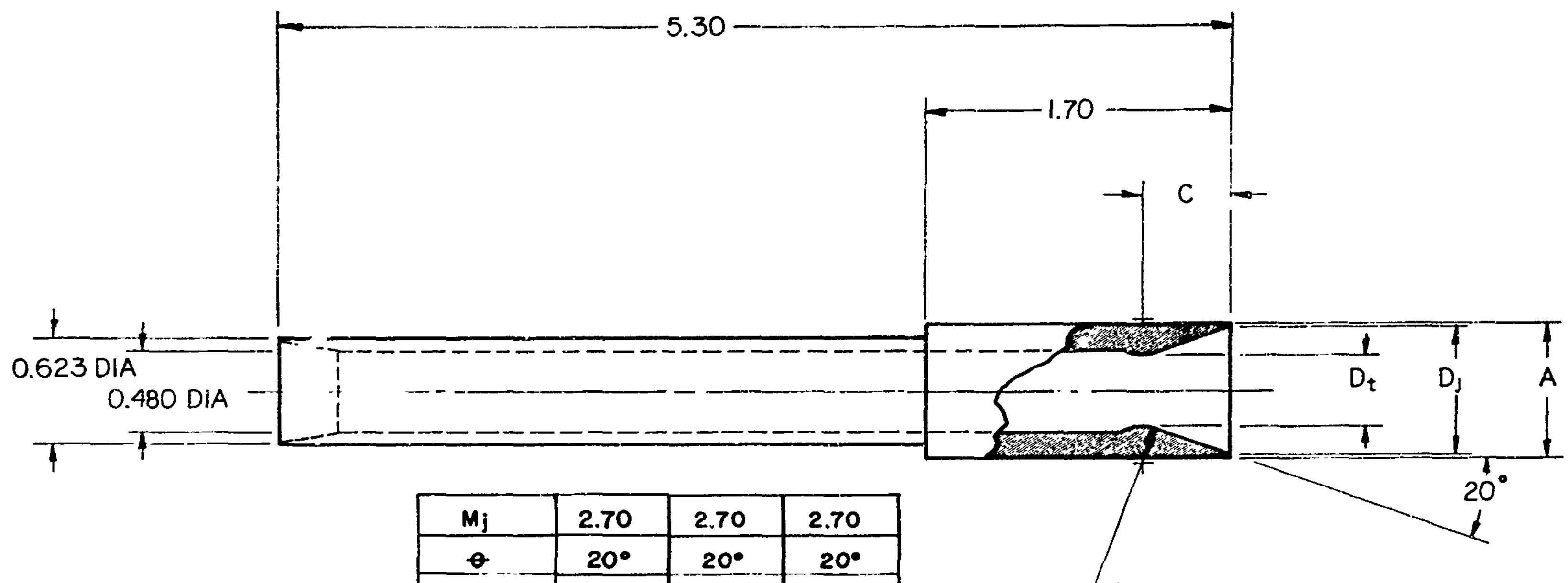
D_B	Reference diameter of model
D_j	Diameter of nozzle at exit plane
M_j	Nozzle design Mach number
M_∞	Free stream Mach number
p_c	Jet stagnation pressure
p_B	Mean base pressure
p_∞	Free stream static pressure
R_N	Reynolds number per inch
X_n	Location of nozzle exit plane relative to model base, negative rearward
θ_j	Half-angle divergence of nozzles



ORIFICE	X	ORIFICE	X
1	2.846	11	0.929
2	2.846	12	0.929
3	2.306	13	0.000
4	2.061	14	0.000
5	1.805	15	0.000
6	1.347	16	0.928
7	0.929	17	2.064
8	0.562	18	1.660
9	0.174	19	0.162
10	0.929	—	—

ORIFICE	Y	X	ORIFICE	Y	X
1	0.5063	0	13	1.2500	0.6875
2	0.7299		14		0.8125
3	0.8470		15		0.9375
4	0.9526		16		1.0625
5	1.0469		17		1.3125
6	1.1310		18		1.5625
7	1.2119		19		1.8125
8	1.2500	0.0625	20		2.0625
9		0.1875	21	0.9526	0
10		0.3125	22		
11		0.4375	22		
12		0.5625			

FIGURE 1. MODEL DETAIL

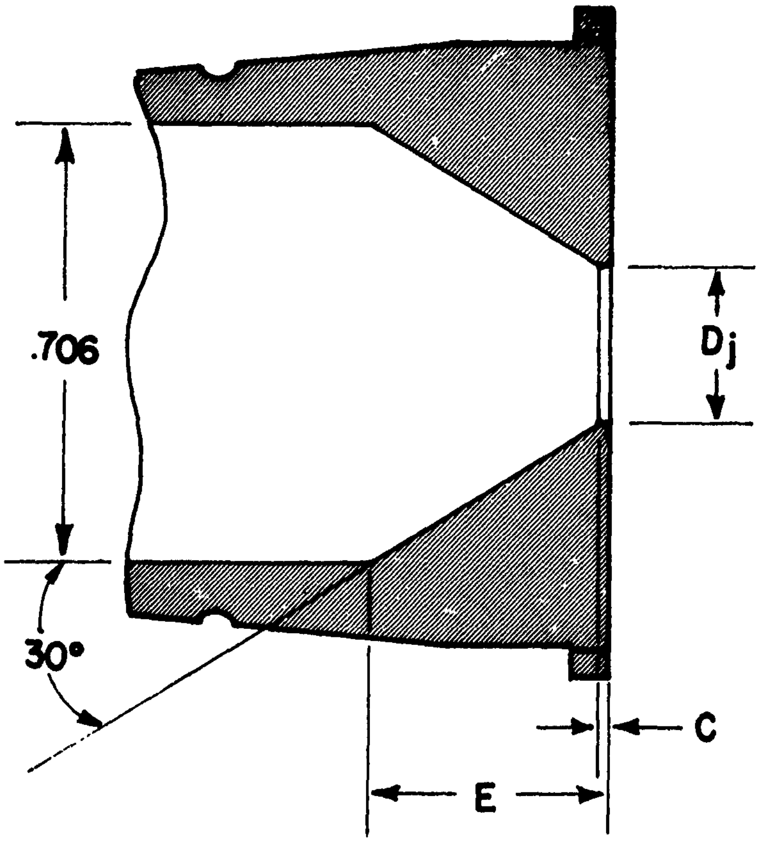


M_j	2.70	2.70	2.70
Φ	20°	20°	20°
D_j / D_B	0.10	0.20	0.30
D_t	0.140	0.280	0.420
D_j	0.250	0.500	0.750
A	0.272	0.520	0.790
C	0.163	0.327	0.490

(b) OPEN BASE - VARIABLE POSITION NOZZLE

FIGURE 1. MODEL DETAIL (Continued)

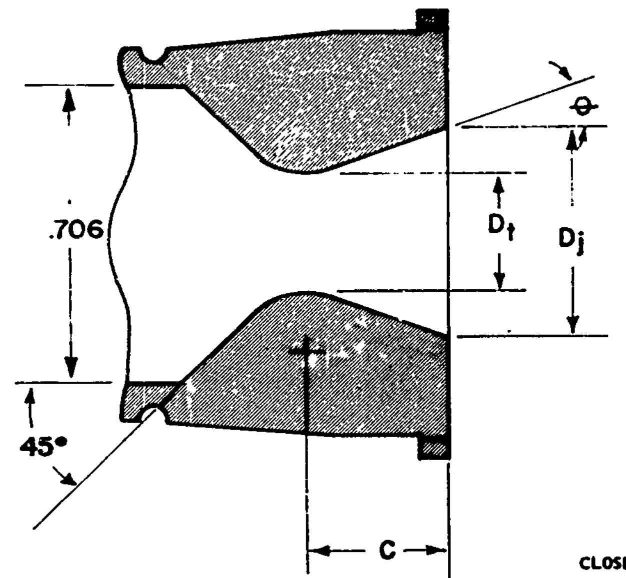
CLOSED BASE SONIC NOZZLE



Mj	1.0	1.0	1.0
θ	—	—	—
D_j/D_B	0.100	0.140	0.200
Dj	0.250	0.352	0.500
C	0.010	0.010	0.010
E	0.404	0.302	0.191

(c) SONIC NOZZLES

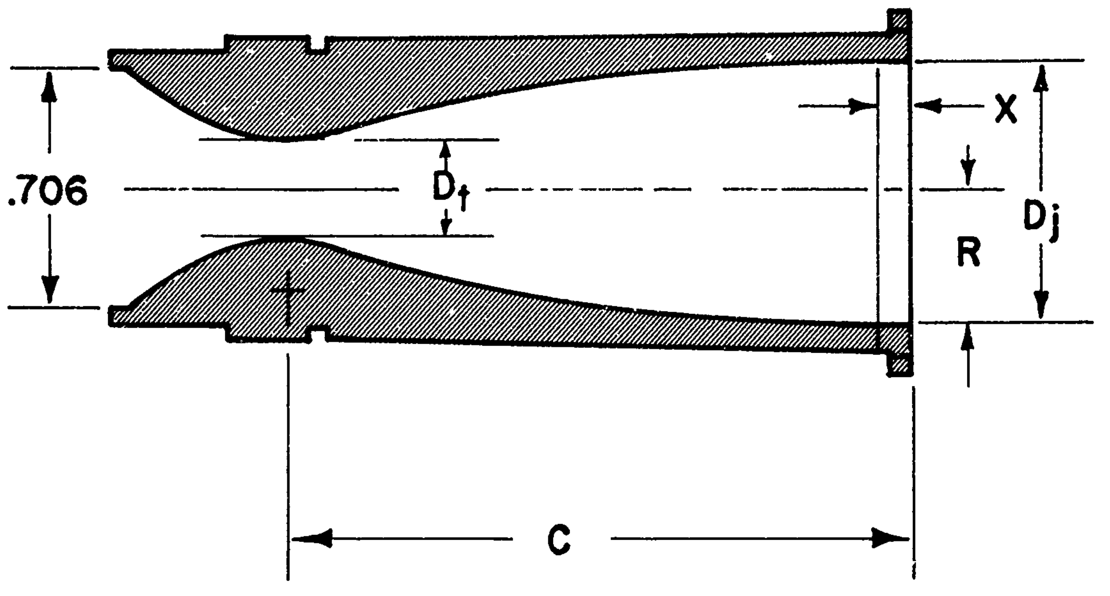
FIGURE 1. MODEL DETAIL (Continued)



Mj	1.78	1.78	1.78	1.78	2.20	2.70	2.70	2.70	2.70	3.20	3.80
Φ	5°	20°	20°	20°	20°	10°	15°	20°	20°	20°	20°
Dj/Ds	.200	.100	.200	.300	.200	.200	.200	.200	.300	.200	.200
D_t	.420	.209	.420	.630	.353	.280	.280	.280	.420	.221	.167
Dj	.500	.250	.500	.750	.500	.500	.500	.500	.750	.500	.500
C	.464	.075	.143	.221	.233	.636	.429	.327	.491	.403	.472

(d) CONICAL NOZZLES

FIGURE 1. MODEL DETAIL (Continued)



CLOSED BASE
CONTOURED NOZZLES

Mj	1.78	1.78	2.20	2.70	2.70	3.20	3.20
θ	0	0	0	0	0	0	0
D_j/D_B	.168	.200	.200	.200	.252	.200	.320
D_t	.352	.420	.352	.280	.352	.220	.362
D_j	.420	.500	.500	.500	.629	.500	.800
C	.591	.703	.909	1.096	1.382	1.249	1.996

(e) CONTOURED NOZZLES

FIGURE 1. MODEL DETAIL (Concluded)

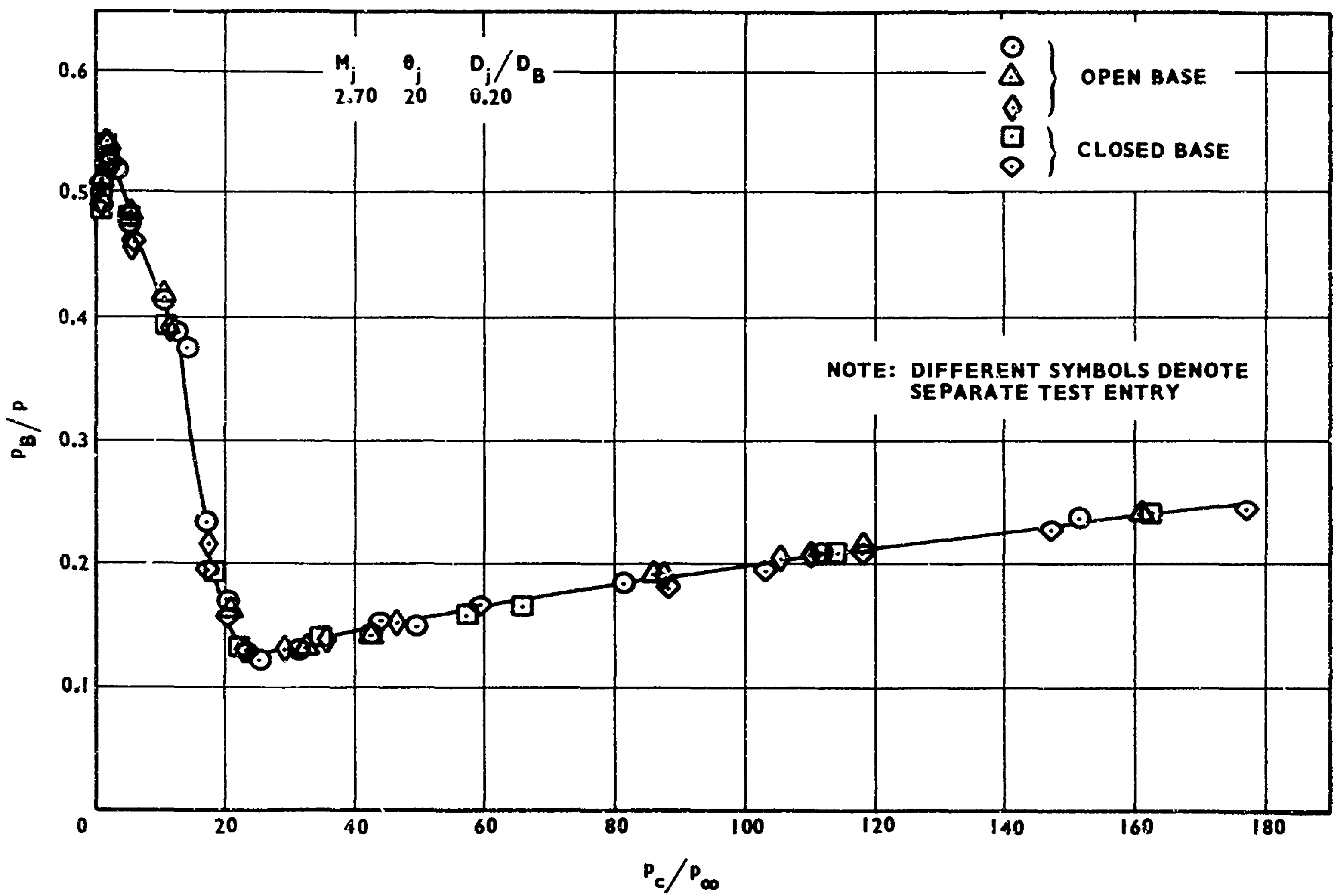


FIGURE 2. BASE PRESSURE FOR OPEN VERSUS CLOSED BASE CONFIGURATIONS

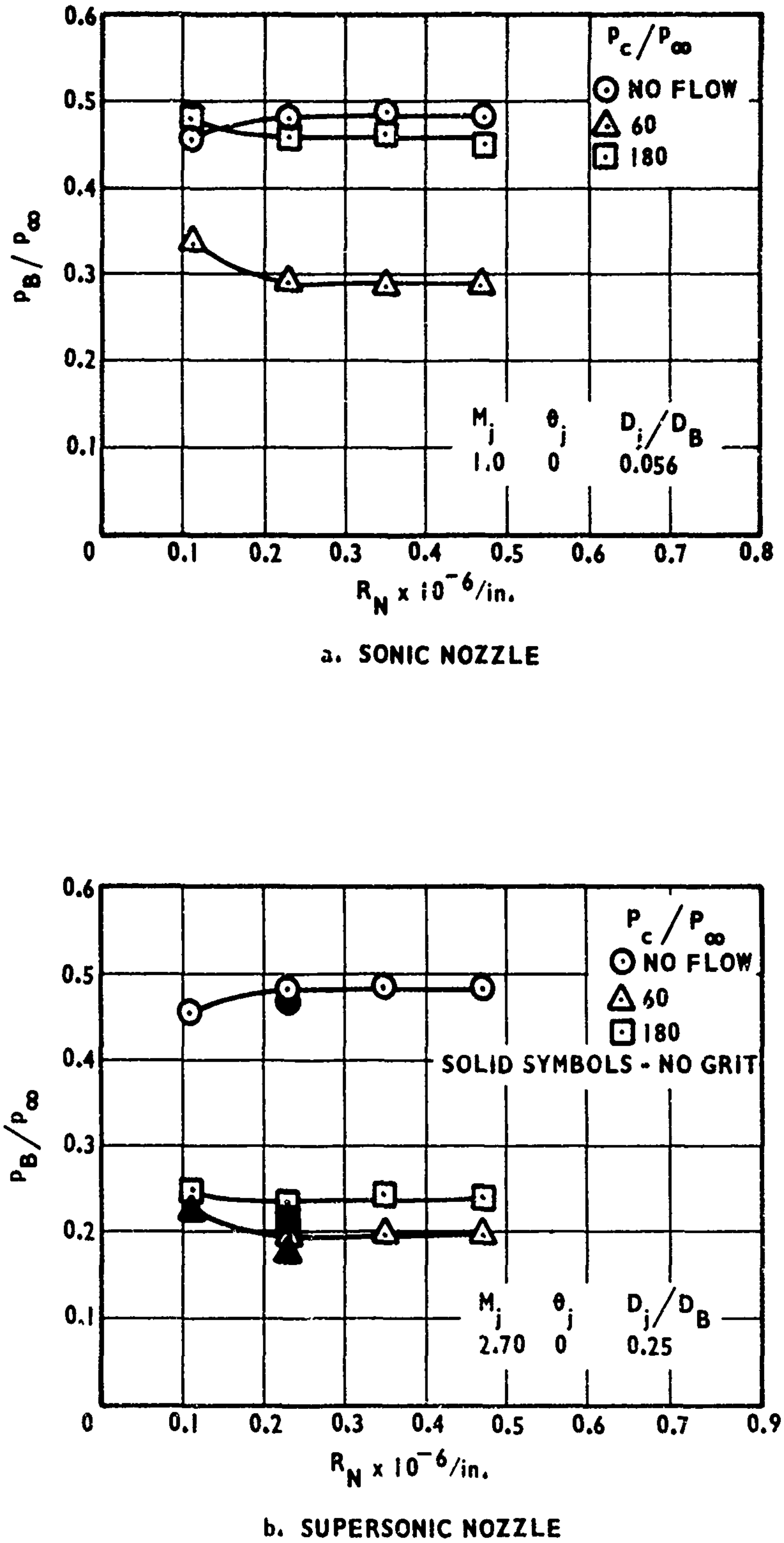
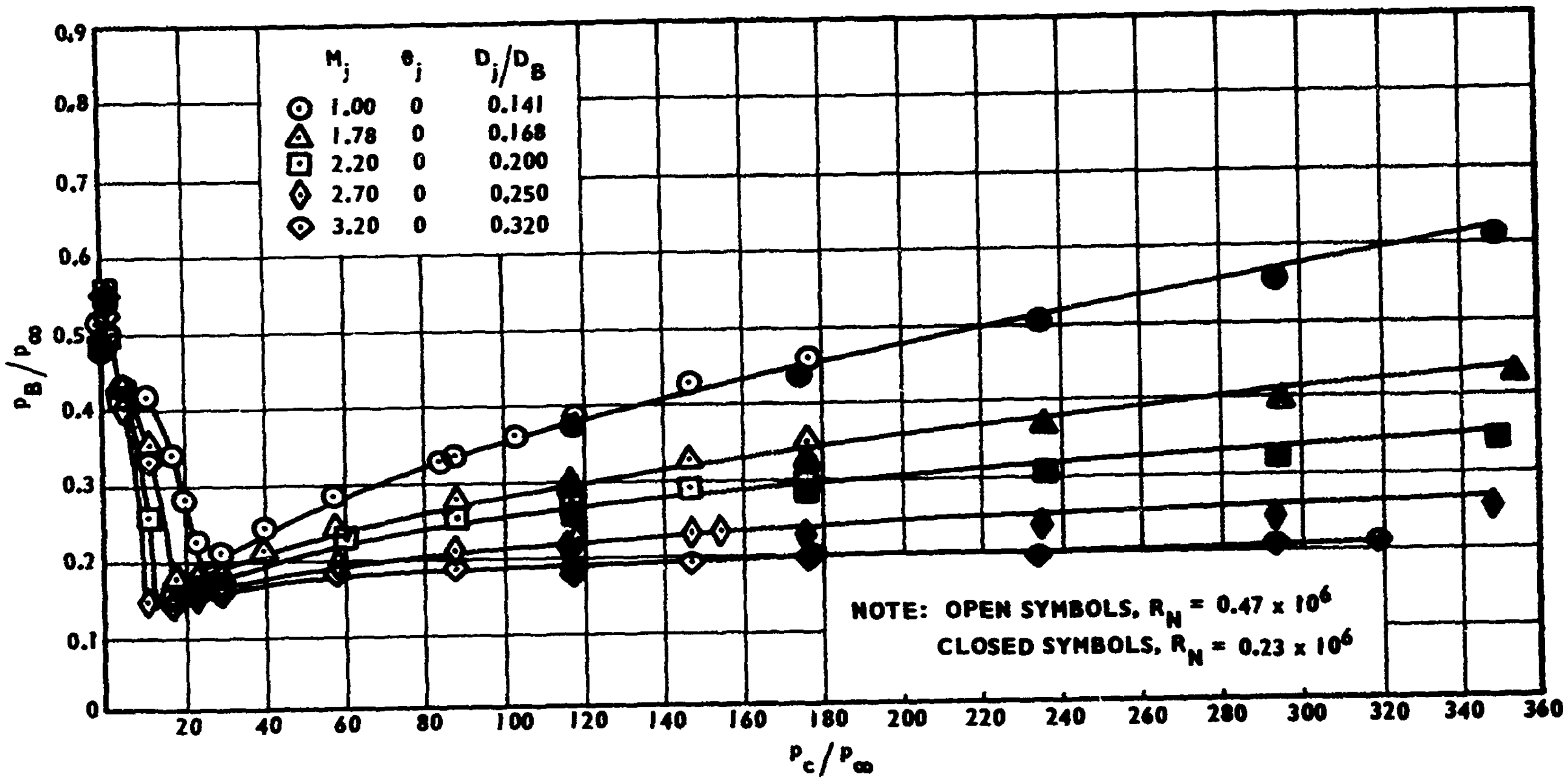


FIGURE 3. REYNOLDS NUMBER EFFECT ON BASE PRESSURE



a. M_∞ = 2.50

FIGURE 4. EFFECT OF JET MACH NUMBER ON BASE PRESSURE, CONSTANT THROAT DIAMETER

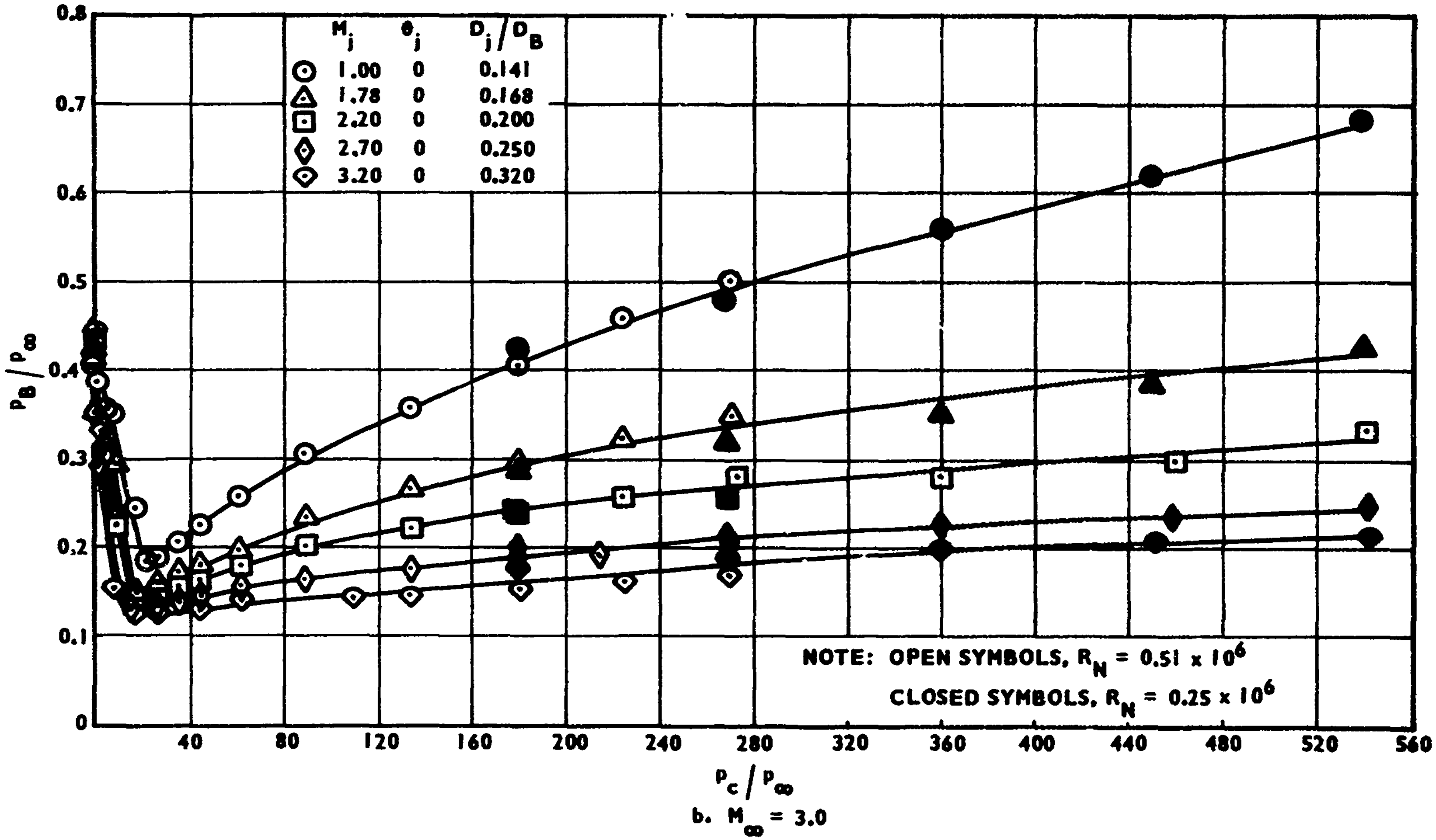
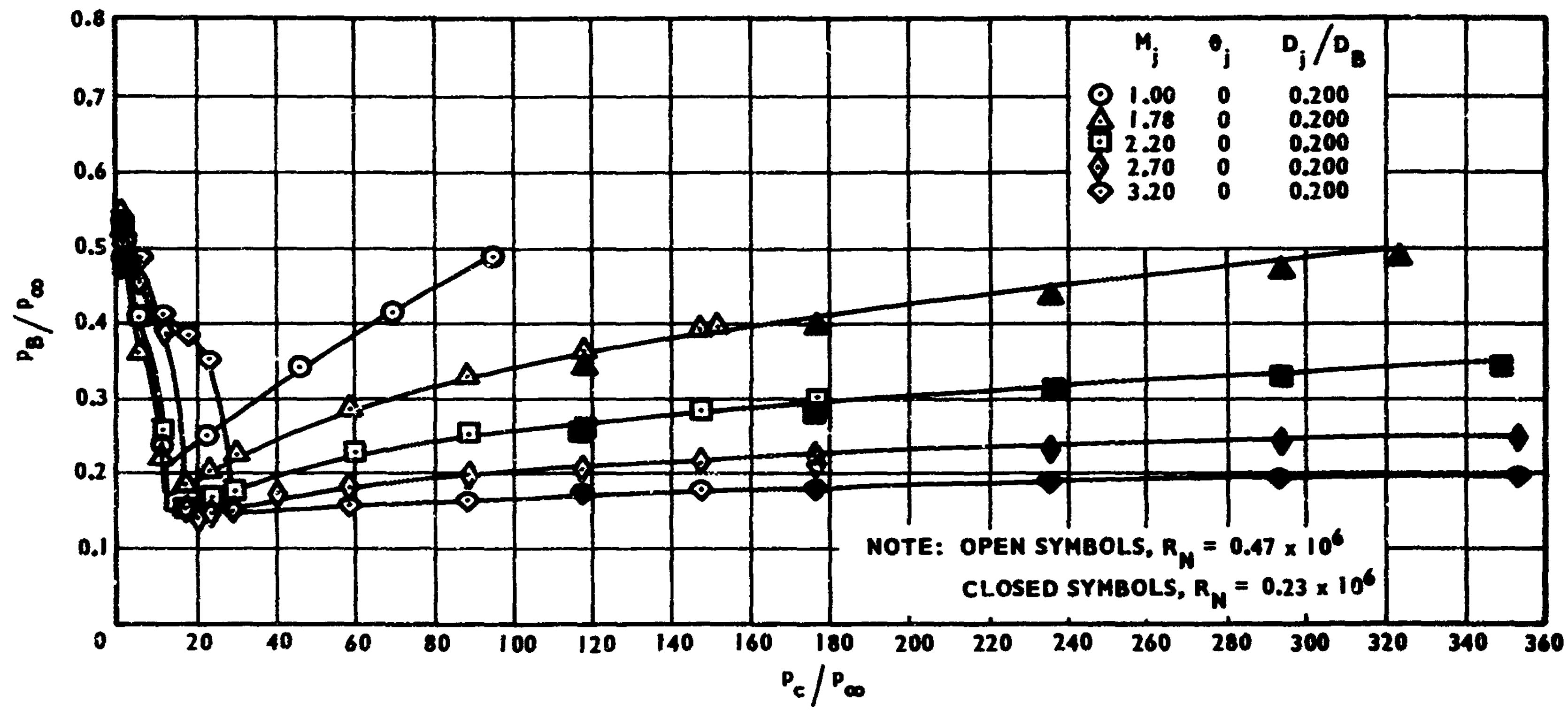
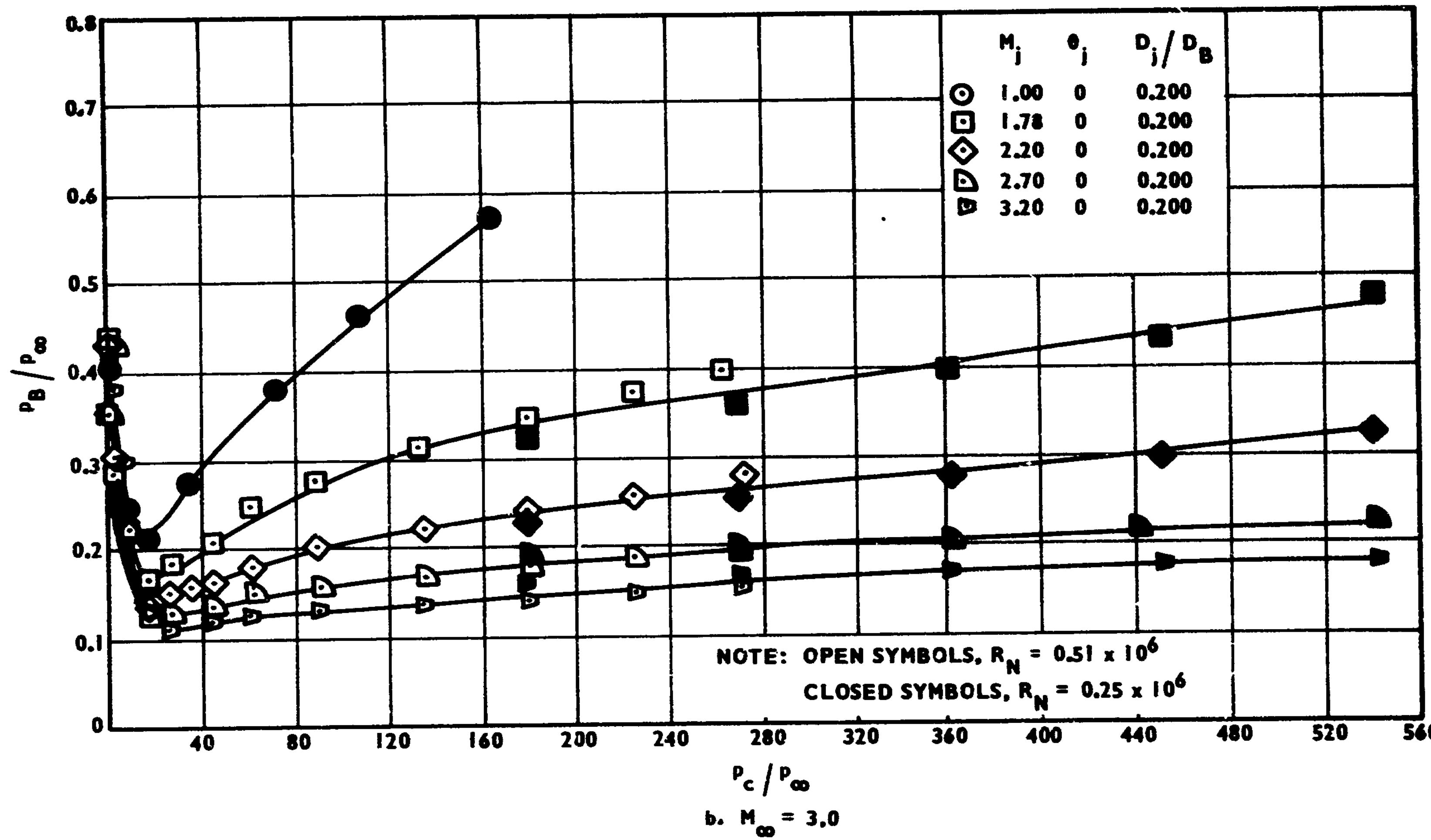


FIGURE 4. EFFECT OF JET MACH NUMBER ON BASE PRESSURE, CONSTANT THROAT DIAMETER (Concluded)



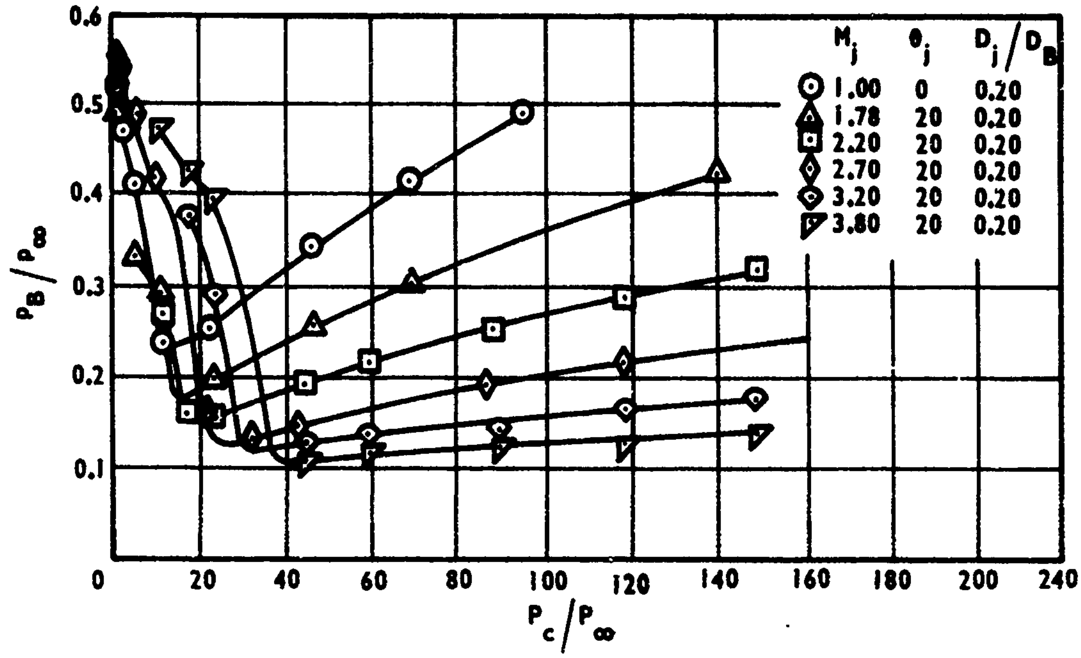
a. $M_\infty = 2.50$

FIGURE 5. EFFECT OF JET MACH NUMBER ON BASE PRESSURE, CONTOURED NOZZLES, CONSTANT EXIT DIAMETER

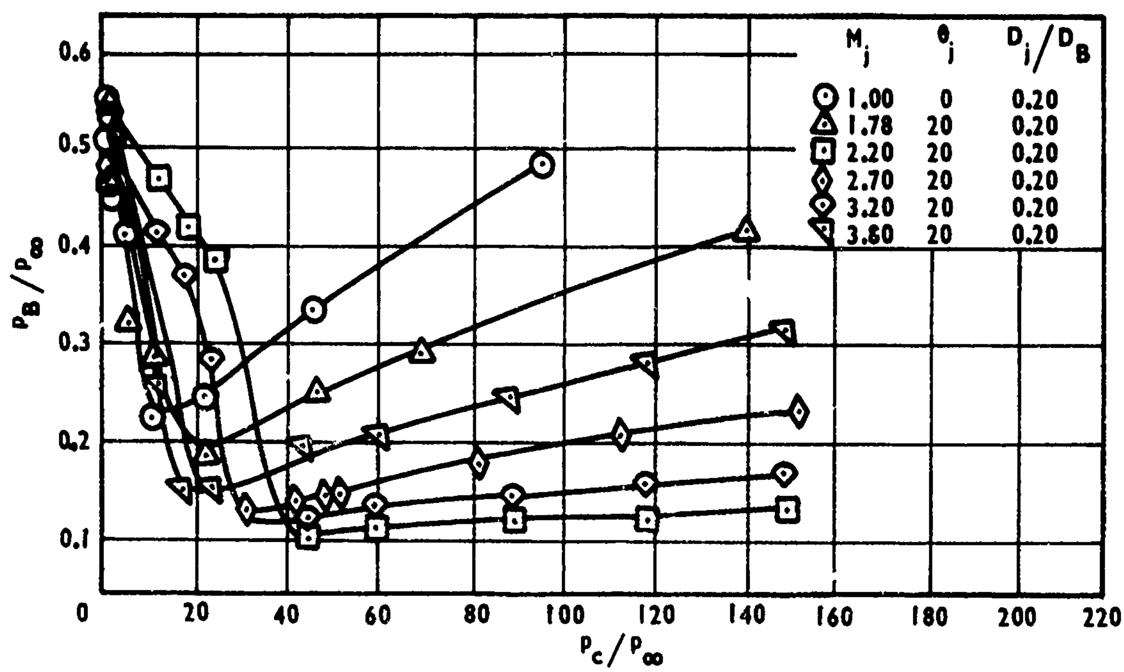


b. $M_\infty = 3.0$

FIGURE 5. EFFECT OF JET MACH NUMBER ON BASE PRESSURE, CONTOURED NOZZLES, CONSTANT EXIT DIAMETER (Concluded)

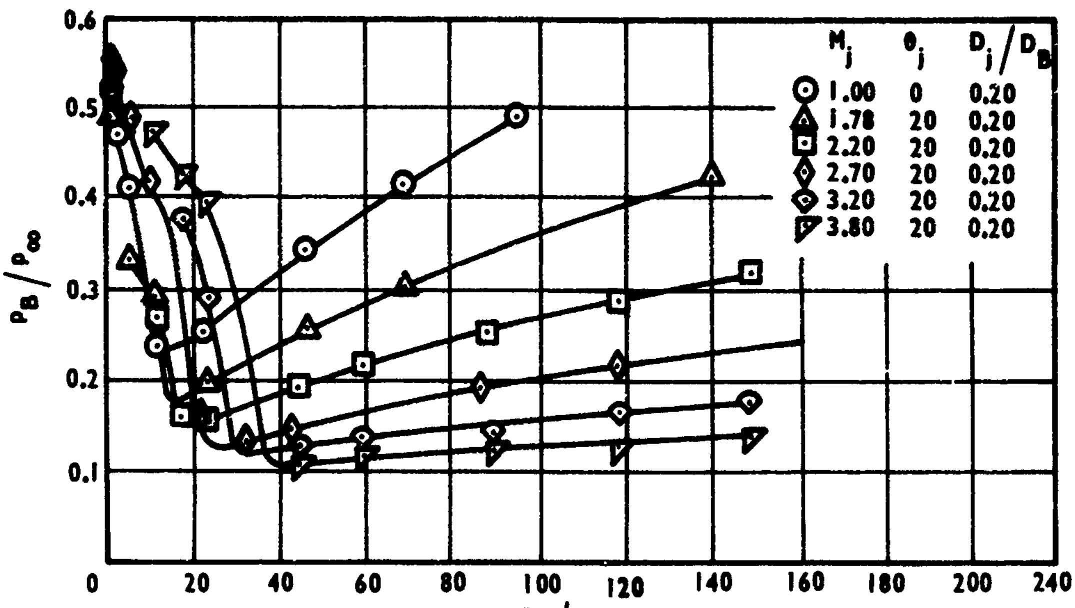


a. $M_\infty = 2.5$

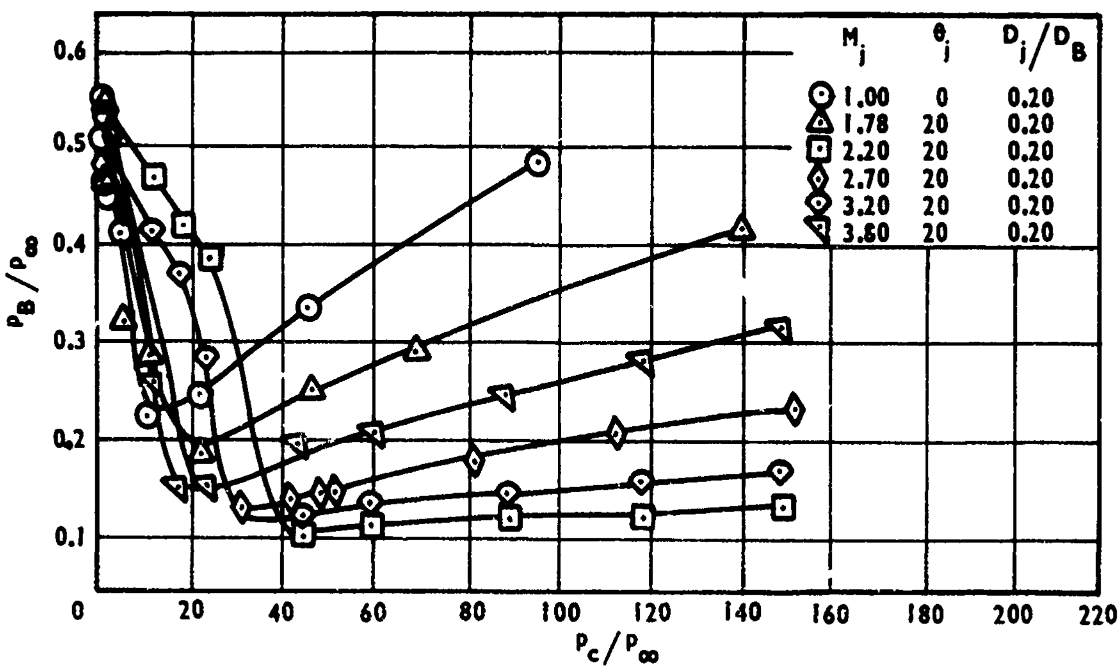


b. $M_\infty = 3.0$

FIGURE 6. EFFECT OF JET MACH NUMBER ON BASE PRESSURE, CONICAL NOZZLES, CONSTANT EXIT DIAMETER

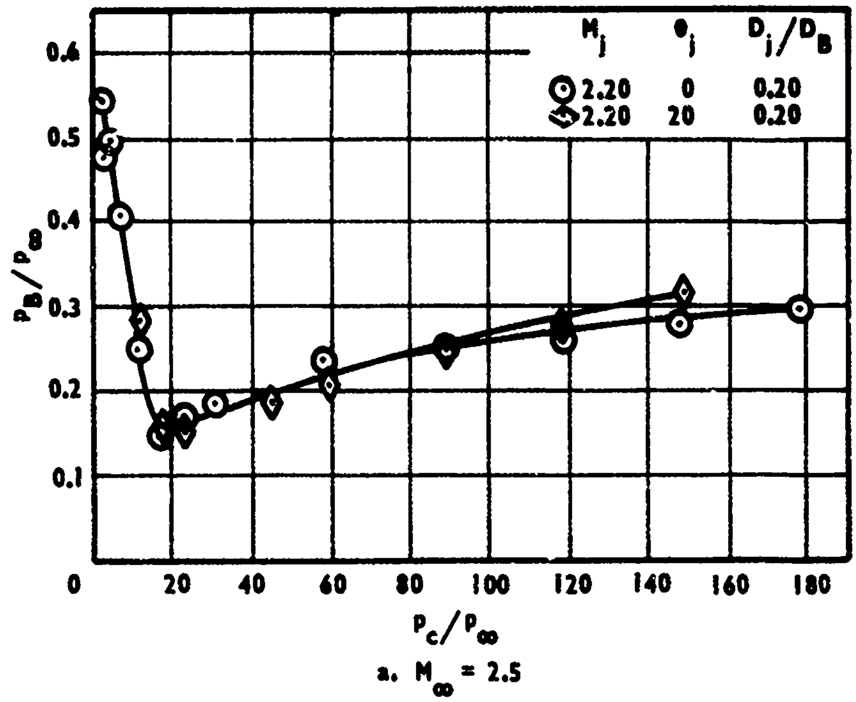


a. $M_\infty = 2.5$

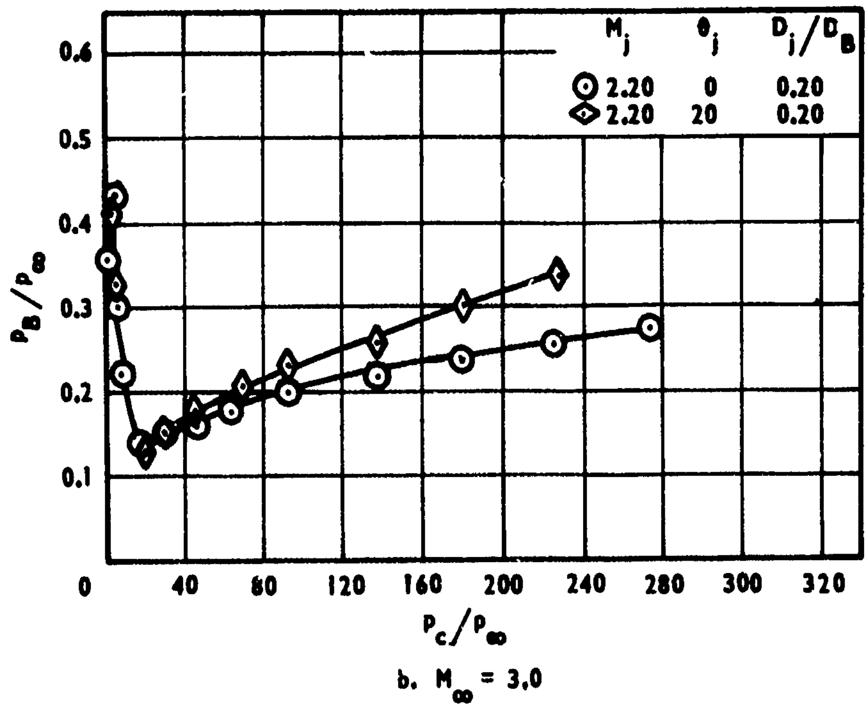


b. $M_\infty = 3.0$

FIGURE 6. EFFECT OF JET MACH NUMBER ON BASE PRESSURE, CONICAL NOZZLES, CONSTANT EXIT DIAMETER



a. $M_\infty = 2.5$



b. $M_\infty = 3.0$

FIGURE 8. EFFECT OF NOZZLE ANGLE ON BASE PRESSURE, EXIT MACH NUMBER = 2.20

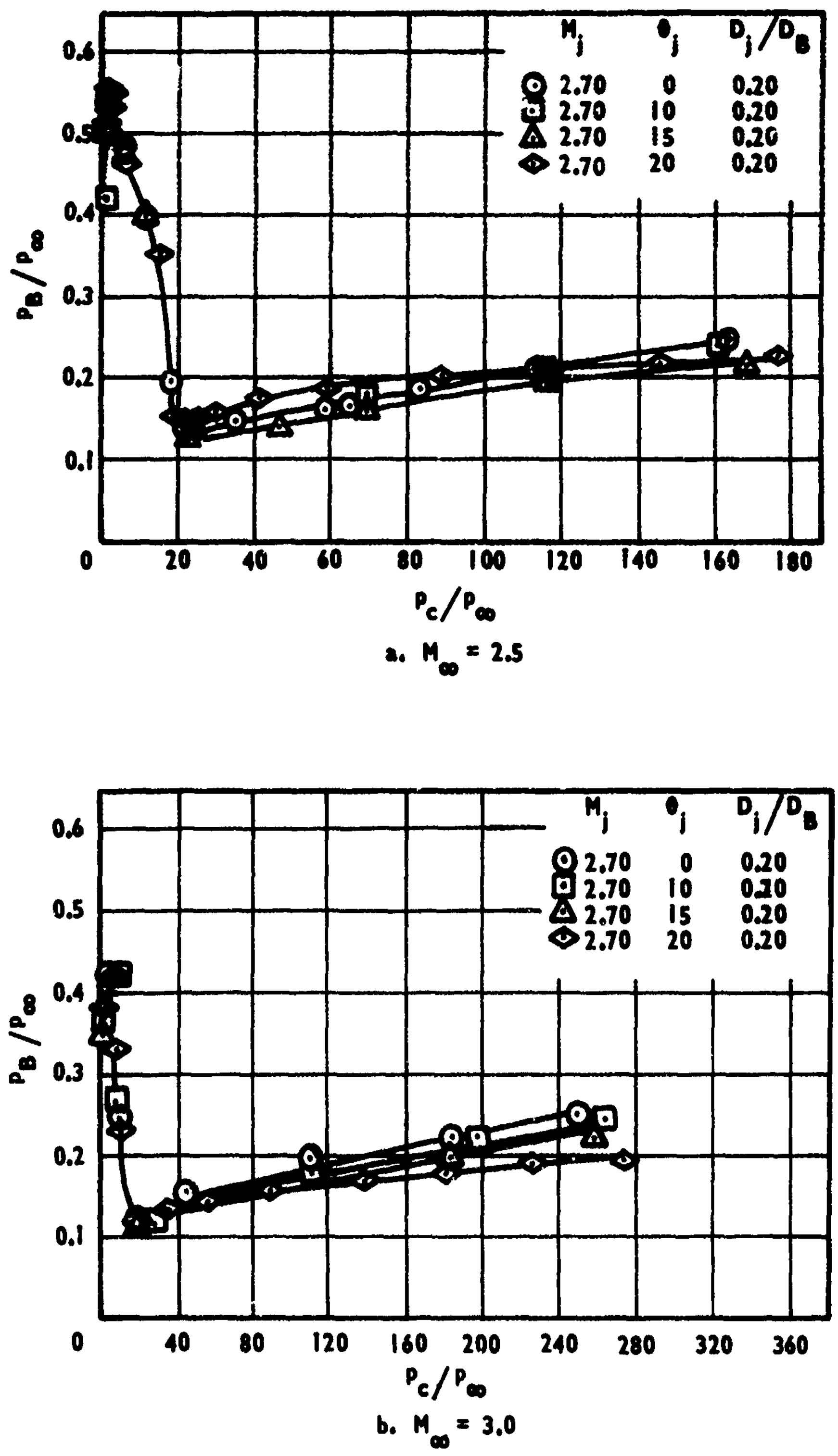
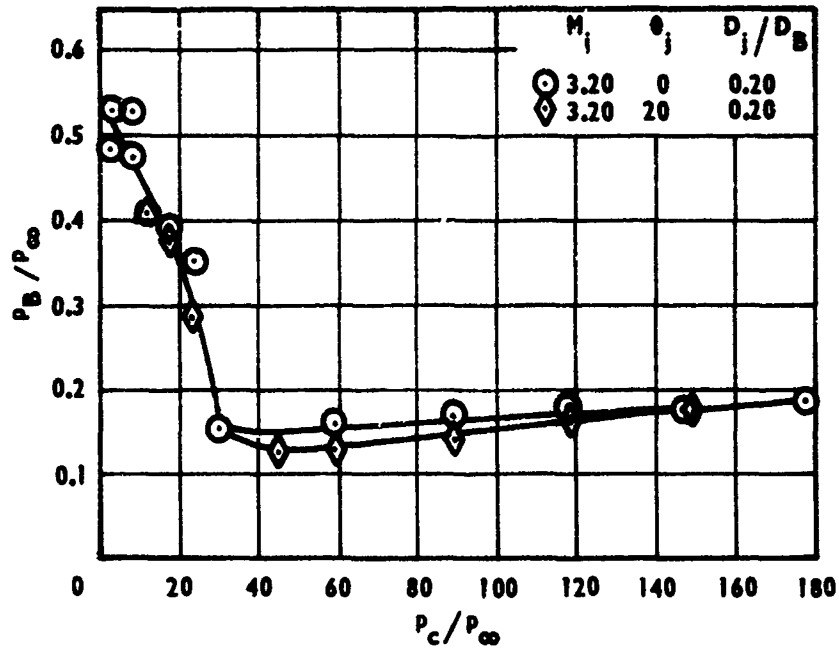
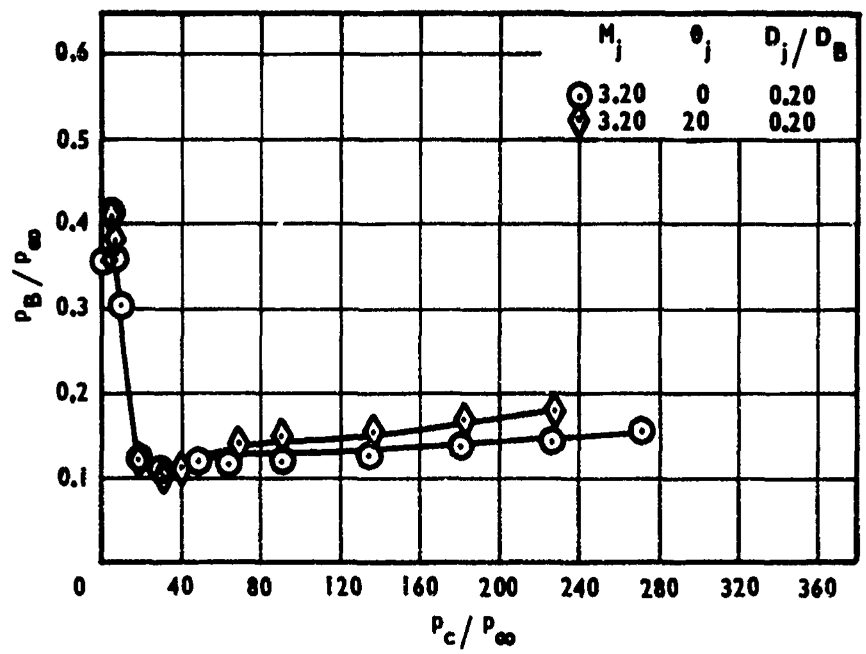


FIGURE 9. EFFECT OF NOZZLE ANGLE ON BASE PRESSURE, EXIT MACH NUMBER = 2.70

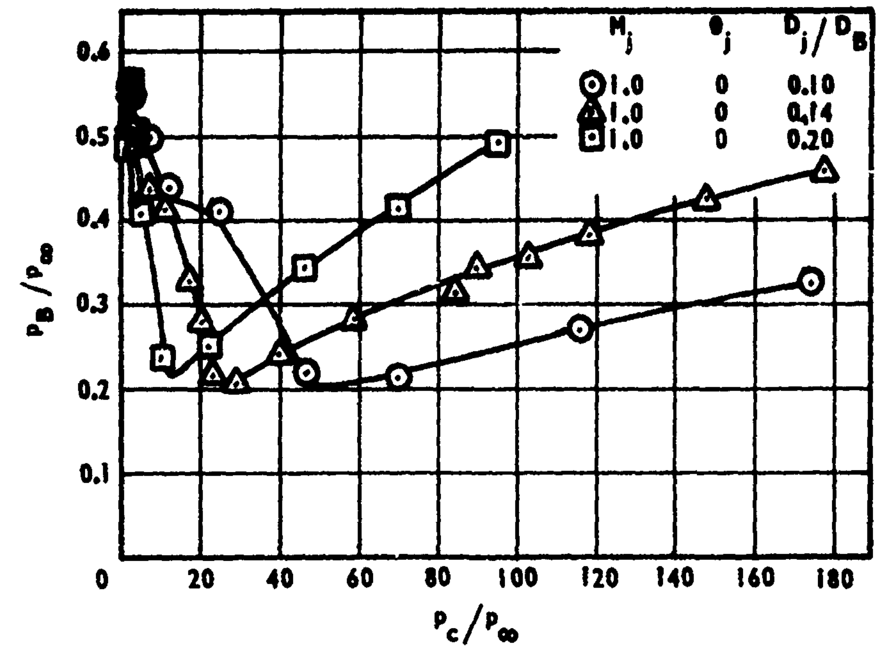


a. $M_\infty = 2.5$

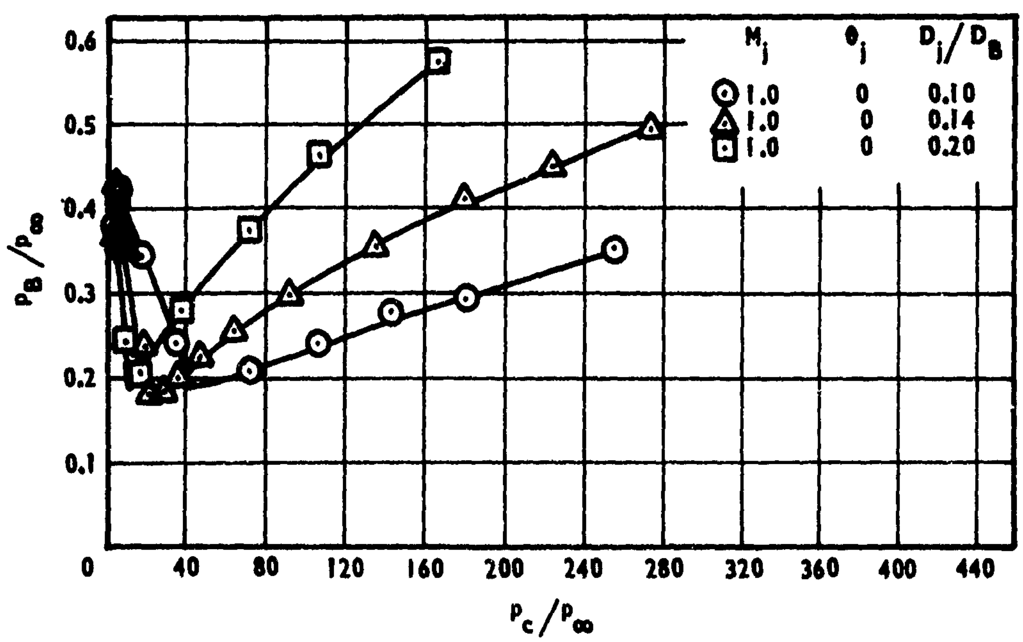


b. $M_\infty = 3.0$

FIGURE 10. EFFECT OF NOZZLE ANGLE ON BASE PRESSURE, EXIT MACH NUMBER = 3.20

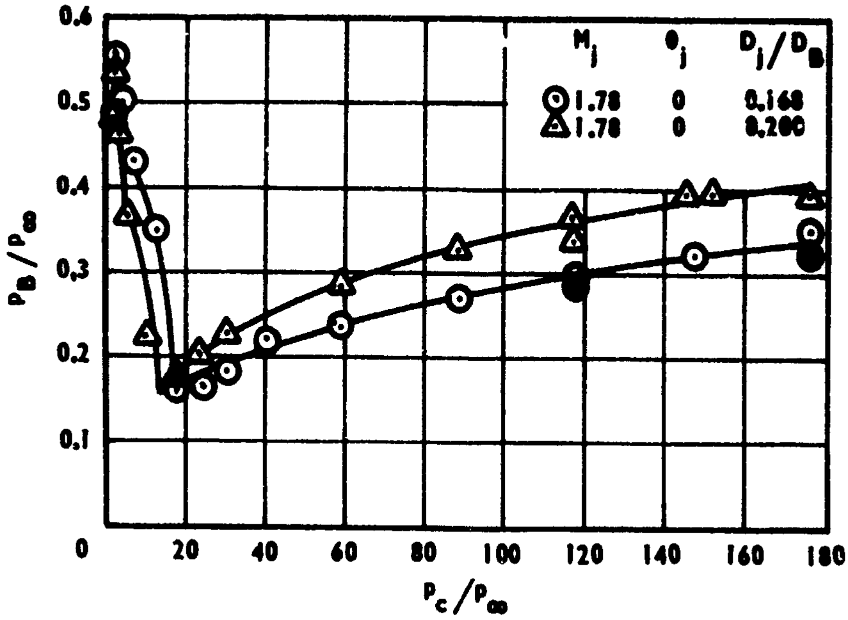


a. $M_\infty = 2.5$

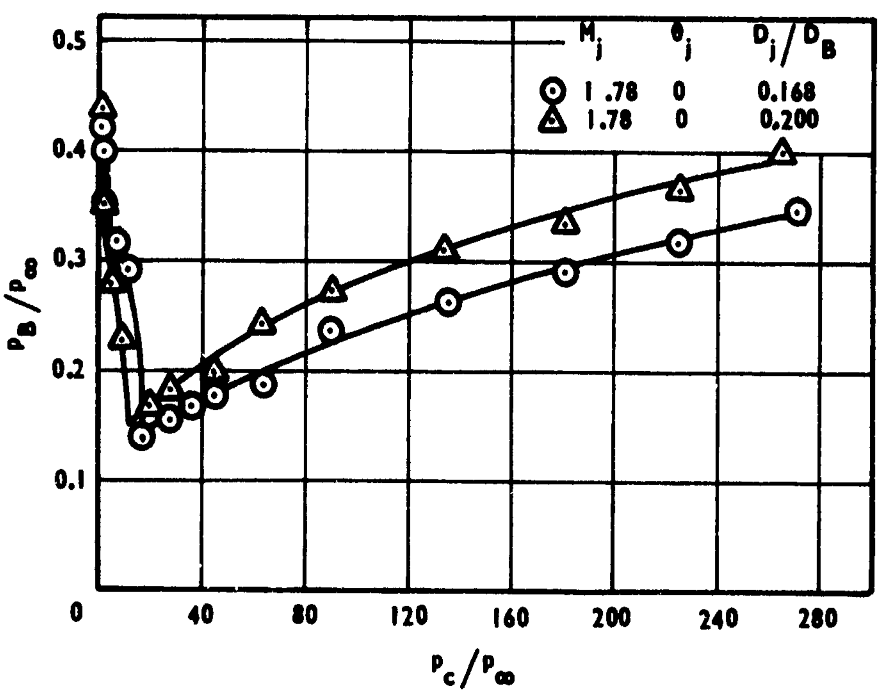


b. $M_\infty = 3.0$

FIGURE 11. EFFECT OF NOZZLE DIAMETER ON BASE PRESSURE, EXIT MACH NUMBER = 1.00



a. M_∞ = 2.5



b. M_∞ = 3.0

FIGURE 12. EFFECT OF NOZZLE DIAMETER ON BASE PRESSURE, EXIT MACH NUMBER = 1.78, CONTOURED NOZZLES

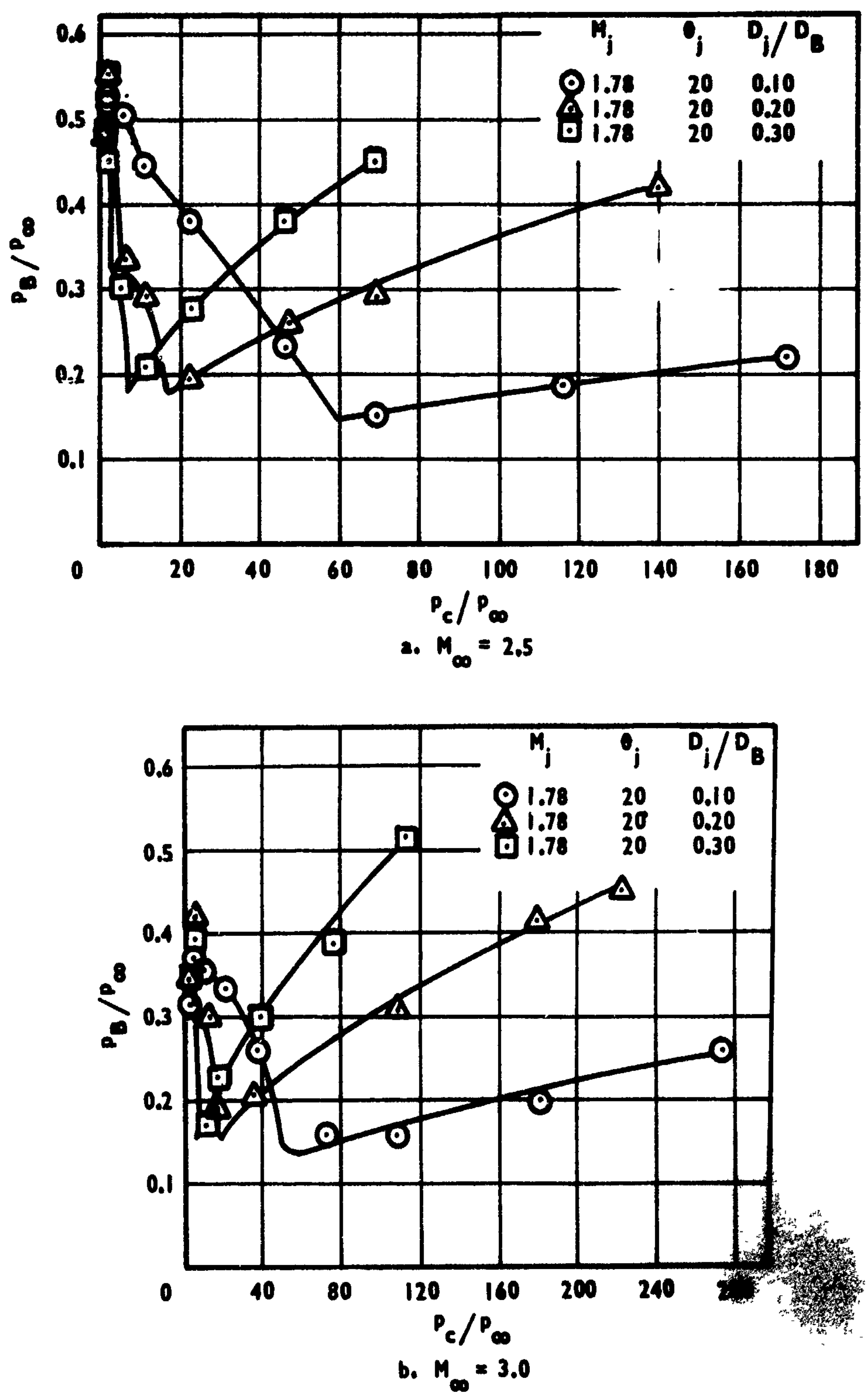


FIGURE 13. EFFECT OF NOZZLE DIAMETER ON BASE PRESSURE, EXIT MACH NUMBER = 1.78, CONICAL NOZZLES

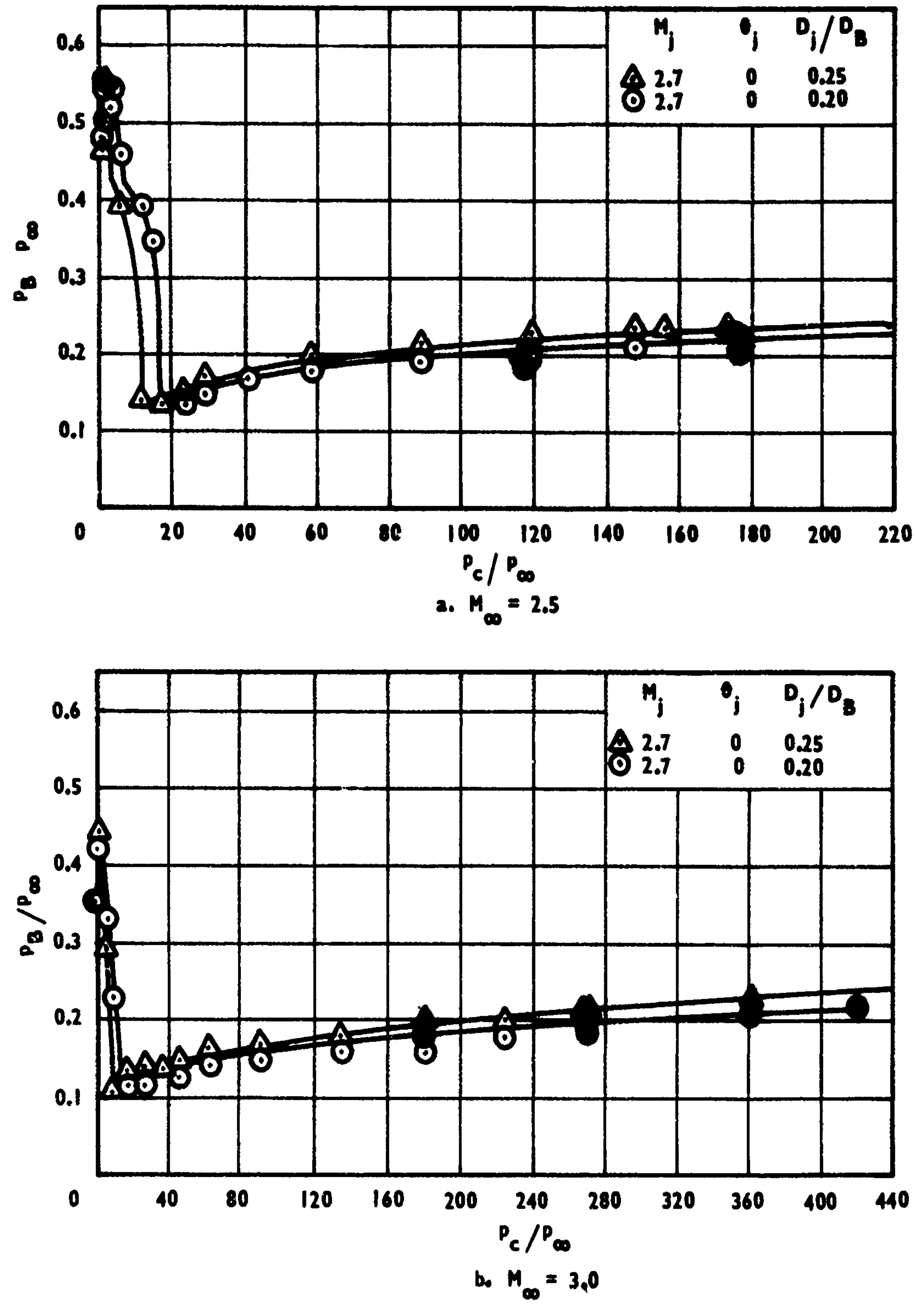
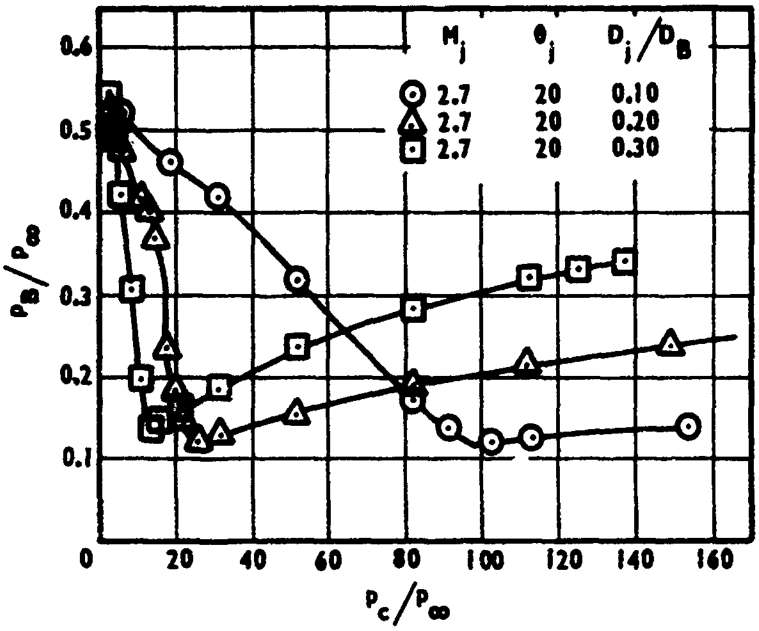
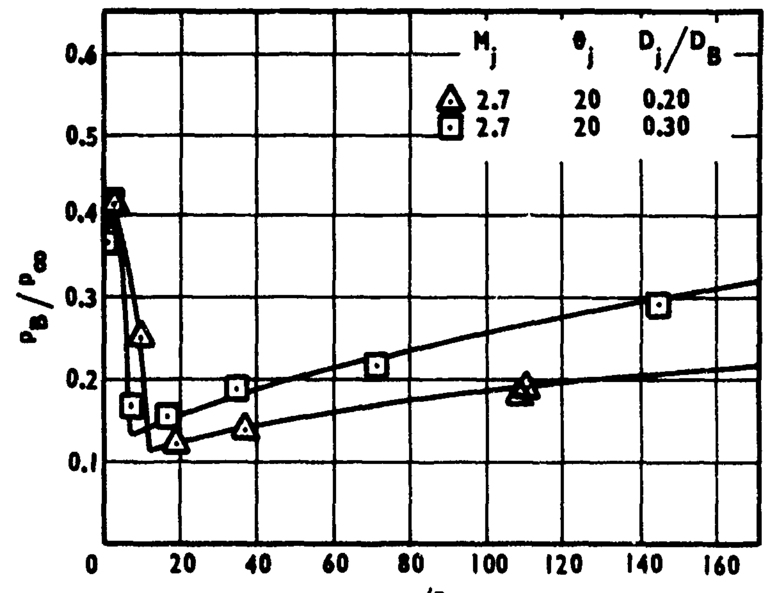


FIGURE 14. EFFECT OF NOZZLE DIAMETER ON BASE PRESSURE, EXIT MACH NUMBER = 2.70, CONTOURED NOZZLES

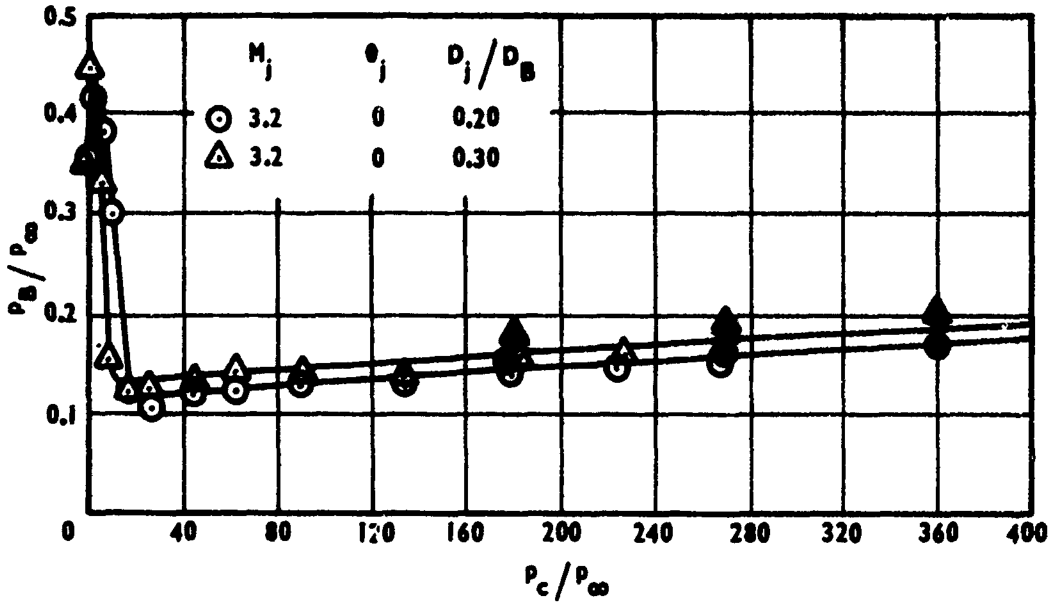


a. $M_\infty = 2.5$

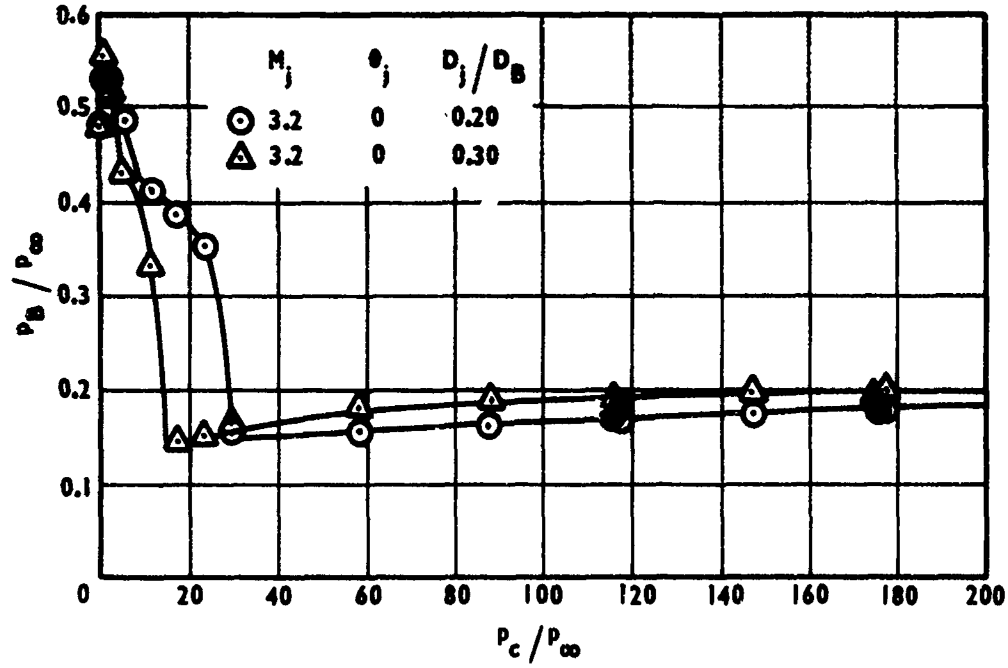


b. $M_\infty = 3.0$

FIGURE 15. EFFECT OF NOZZLE DIAMETER ON BASE PRESSURE, EXIT MACH NUMBER = 2.70, CONICAL NOZZLES

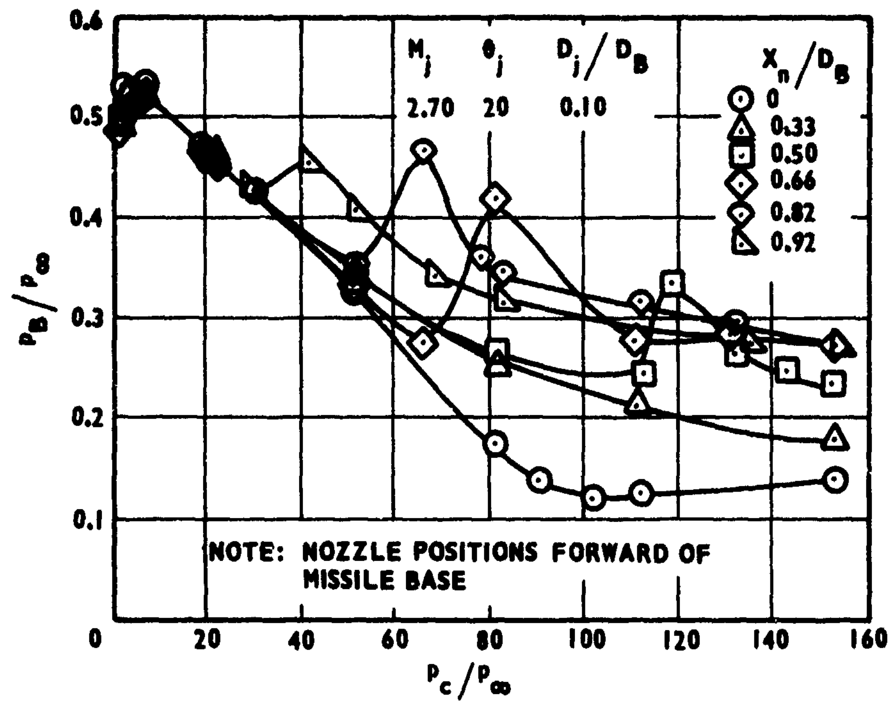


b. $M_\infty = 2.5$



a. $M_\infty = 3.0$

FIGURE 16. EFFECT OF NOZZLE DIAMETER ON BASE PRESSURE, EXIT MACH NUMBER = 3.20



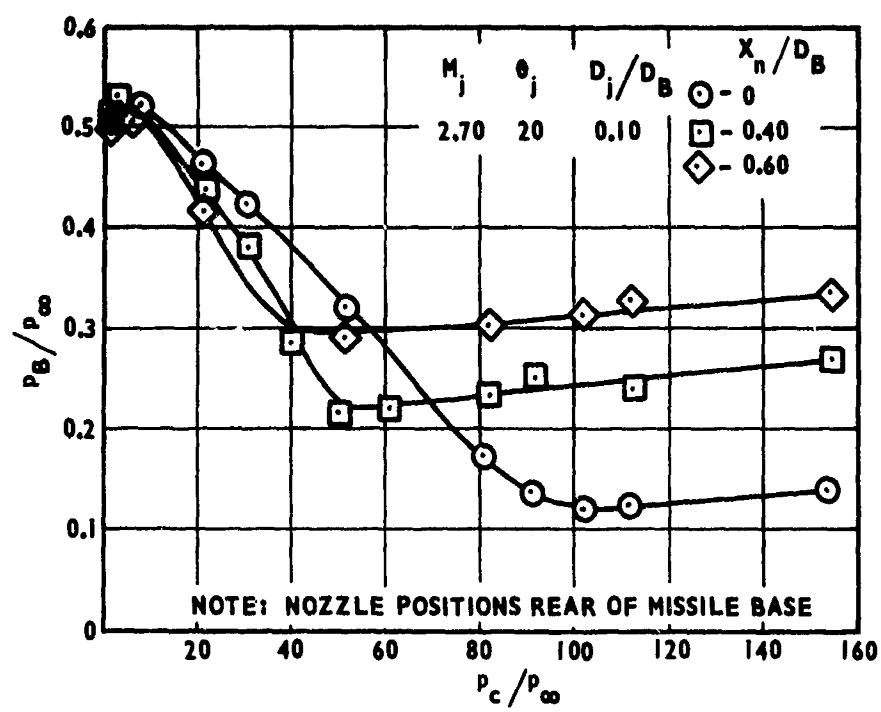
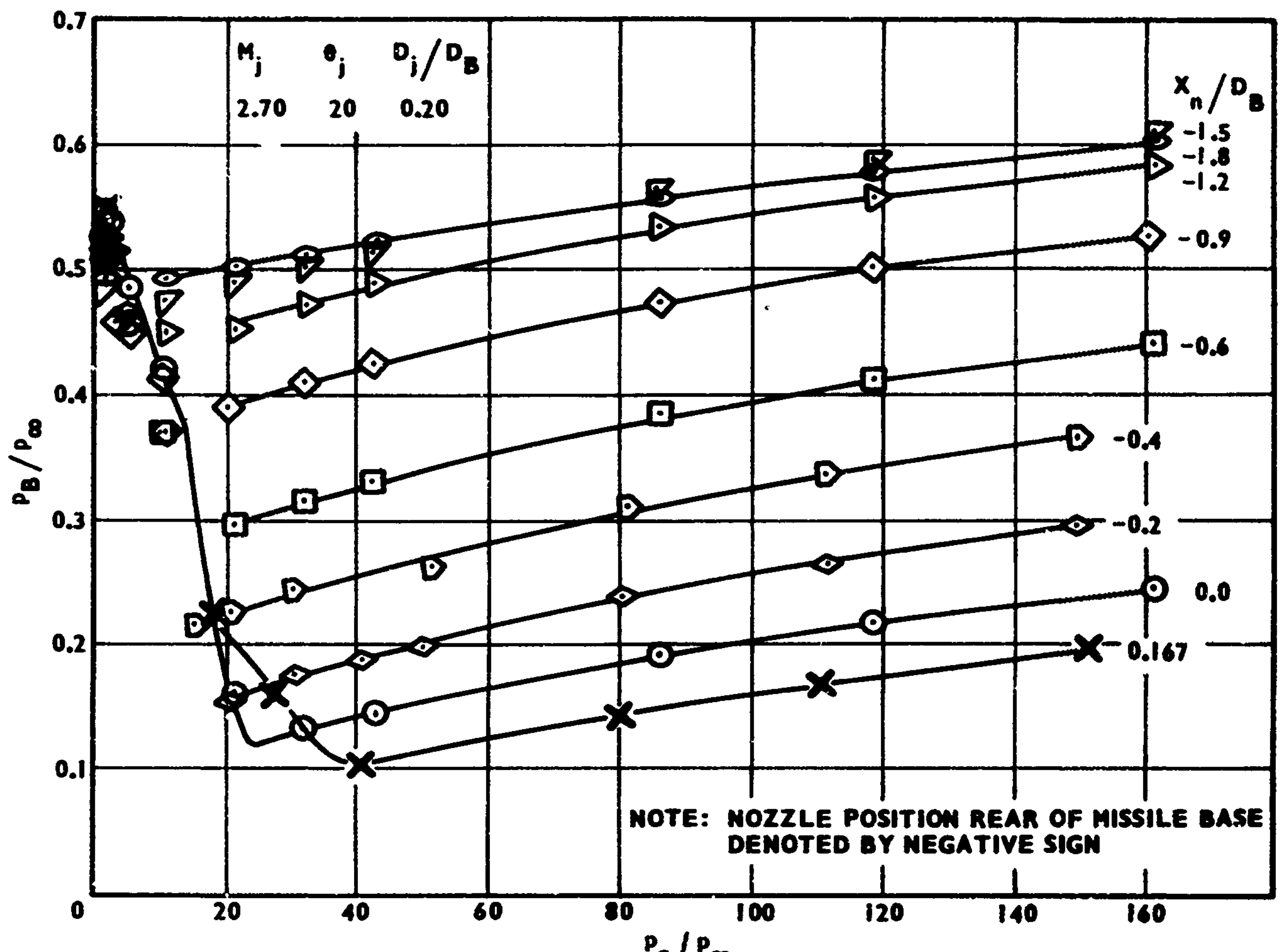
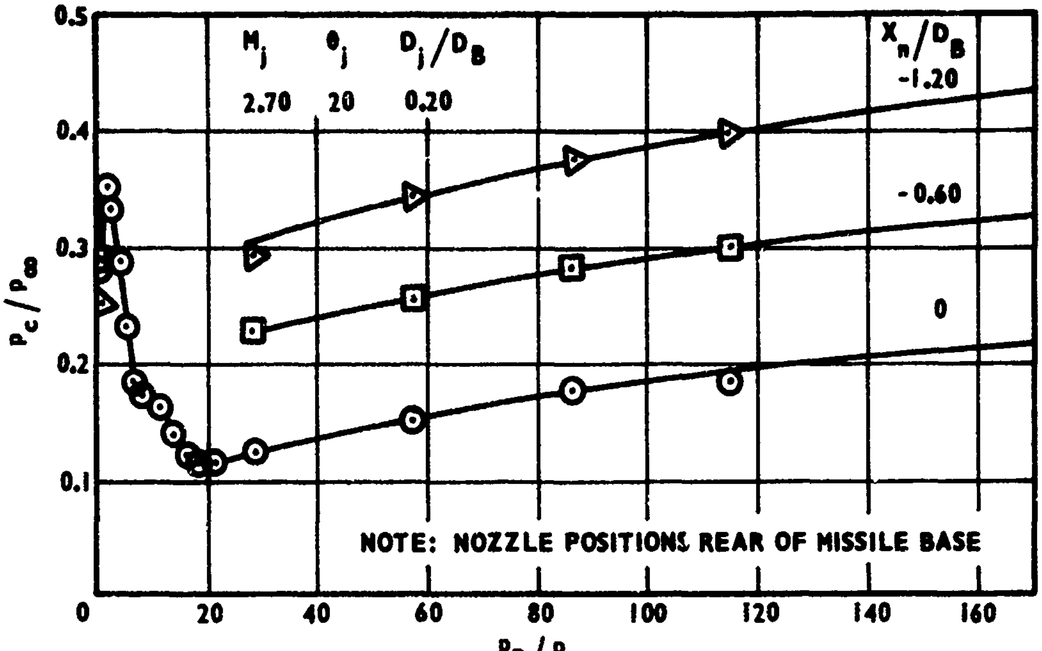


FIGURE 17. EFFECT OF NOZZLE POSITION ON BASE PRESSURE, NOZZLE-BASE RATIO = 0.10, MACH NUMBER = 2.50

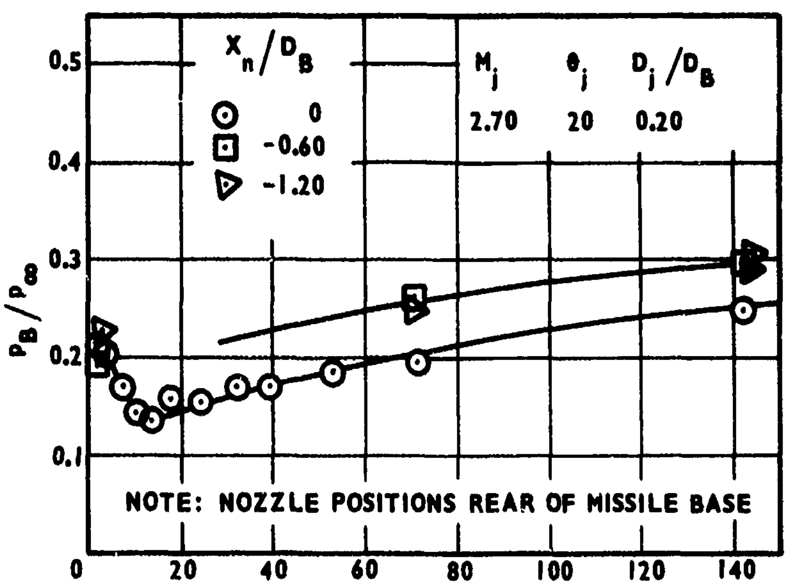


a. $M_\infty = 2.50$

FIGURE 18. EFFECT OF NOZZLE POSITION ON BASE PRESSURE, NOZZLE-BASE RATIO = 0.20



b. $M_\infty = 3.50$



c. $M_\infty = 4.50$

FIGURE 18. EFFECT OF NOZZLE POSITION ON BASE PRESSURE, NOZZLE-BASE RATIO = 0.20 (Concluded)

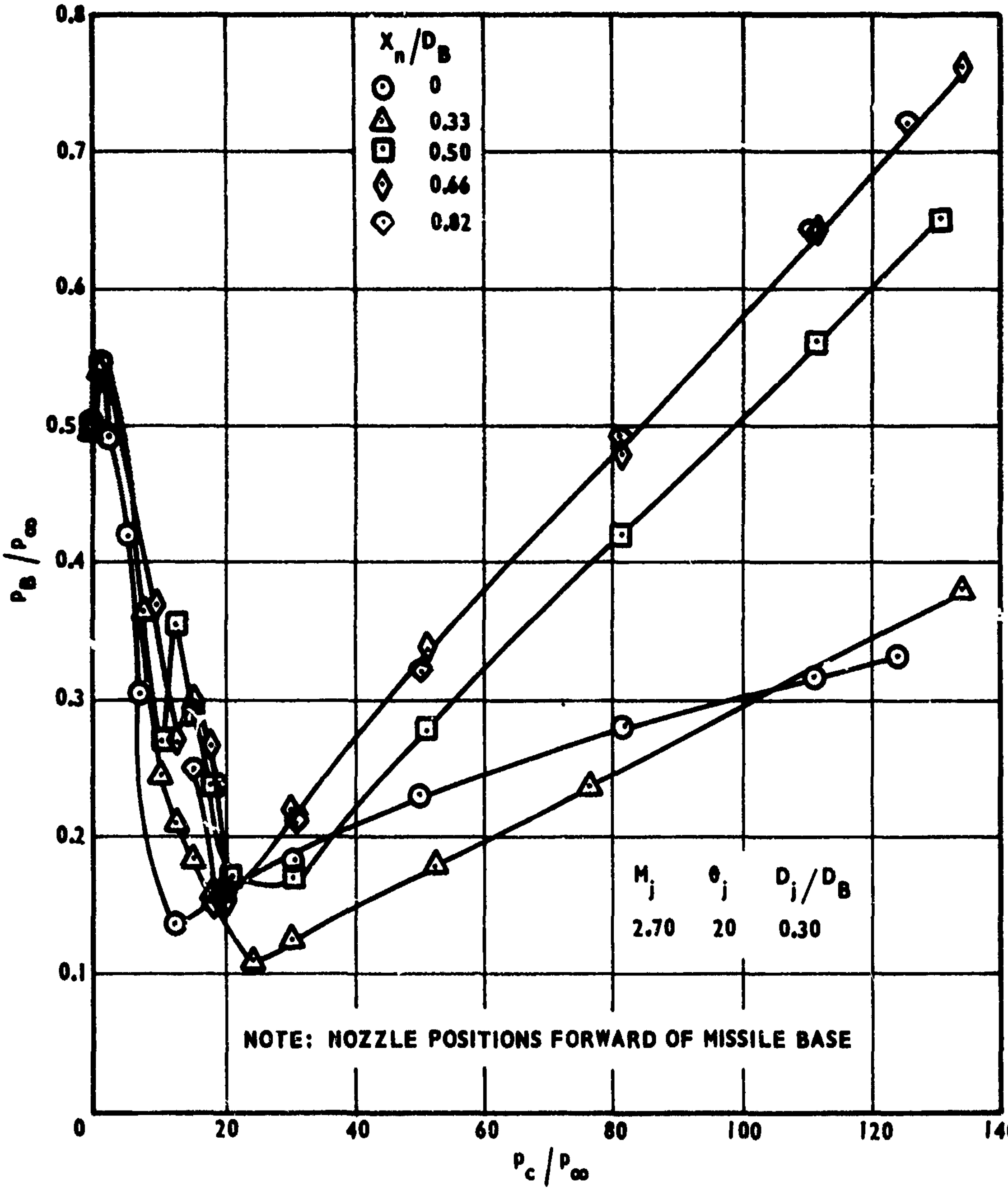


FIGURE 19. EFFECT OF NOZZLE POSITION ON BASE PRESSURE, NOZZLE-BASE RATIO = 0.30, MACH NUMBER = 2.50

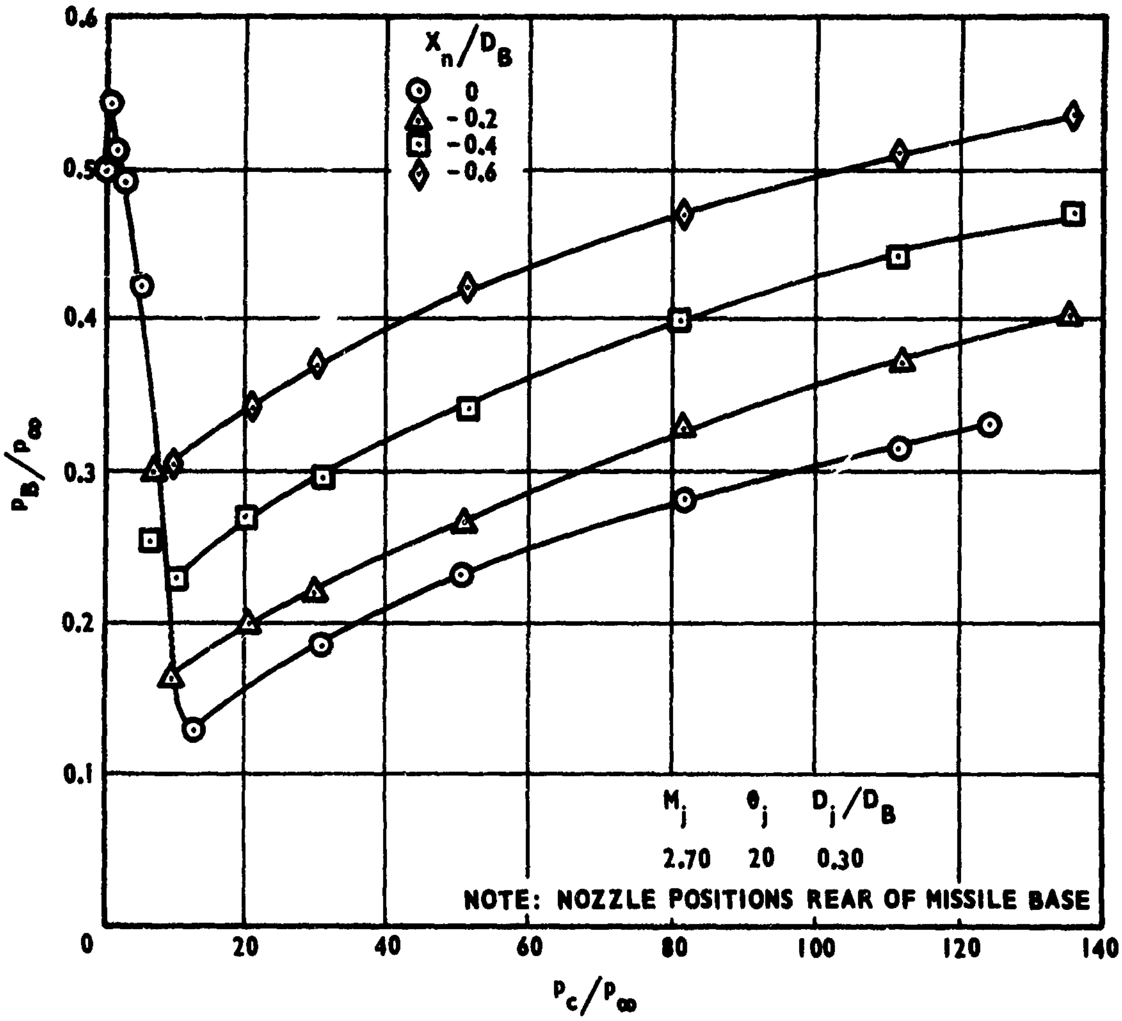


FIGURE 19. EFFECT OF NOZZLE POSITION ON BASE PRESSURE, NOZZLE-BASE RATIO = 0.30, MACH NUMBER = 2.50

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Appendix
Tabulated Test Results

The following data were listed from computer equipment and the symbols used to designate various parameters were selected to facilitate the use of this equipment. The following list identifies the symbols used in this portion of the report:

CPB	Base pressure coefficient, $\left[\frac{PB}{PF} - 1.0\right] \frac{1.0}{0.7\ (MF)^2}$
CT	Thrust coefficient, thrust/[dynamic pressure × reference area]
D*	Diameter of nozzle at the throat (in.)
DJ	Diameter of nozzle at the exit plane (in.)
DB	Reference diameter of body, 2.50 in.
GJ	Jet specific heat ratio
L	Model length (in.)
MF	Free stream Mach number
MJ	Jet exit Mach number
PB	Mean base pressure (psia)
PC	Jet stagnation pressure (psia)
PF	Free stream static pressure (psia)
RMF	Jet momentum flux ratio, $\frac{(PJ)(AJ)(MJ)^2}{(PF)(AB)(MF)^2}$, where $AJ = \pi\ \overline{DJ}^2$, $AB = \pi\ \overline{DB}^2$, and PJ = jet static pressure
THEJ	Divergence half-angle of nozzles (deg)
TOF	Free stream static temperature (°F)
RN	Reynolds number per inch
XJ	Location of nozzle exit plane relative to model base (in.) (negative positions rear of model base)

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The data are arranged according to the index given in Tables A-I through A-III.

TABLE A-I. INDEX TO TABULATED DATA

Group	M_j	θ_j	D_j/D_B	M_∞	$R_N \times 10^{-6}$
1A	1.0	0	0.10	2.50	0.47
	1.0	0	0.10	3.00	0.51
1B	1.0	0	0.14	2.50	0.23
	1.0	0	0.14	2.50	0.47
	1.0	0	0.14	3.00	0.25
	1.0	0	0.14	3.00	0.51
1C	1.0	0	0.20	2.50	0.47
	1.0	0	0.20	3.00	0.51
2A	1.78	0	0.16	2.50	0.23
	1.78	0	0.16	2.50	0.47
	1.78	0	0.16	3.00	0.25
	1.78	0	0.16	3.00	0.51
2B	1.78	0	0.20	2.50	0.23
	1.78	0	0.20	2.50	0.47
	1.78	0	0.20	3.00	0.25
	1.78	0	0.20	3.00	0.51
2C	1.78	5	0.20	2.50	0.47
	1.78	5	0.20	3.00	0.51
2D	1.78	20	0.10	2.50	0.47
	1.78	20	0.10	3.00	0.51
2E	1.78	20	0.20	2.50	0.47
	1.78	20	0.20	3.00	0.51
2F	1.78	20	0.30	2.50	0.47
	1.78	20	0.30	3.00	0.51
3A	2.20	0	0.20	2.50	0.23
	2.20	0	0.20	2.50	0.47
	2.20	0	0.20	3.00	0.25
	2.20	0	0.20	3.00	0.51
3B	2.20	20	0.20	2.50	0.47
	2.20	20	0.20	3.00	0.51
4A	2.70	0	0.20	2.50	0.23
	2.70	0	0.20	2.50	0.51
	2.70	0	0.20	3.00	0.25
	2.70	0	0.20	3.00	0.51

TABLE A-I. INDEX TO TABULATED DATA (Concluded)

Group	M_j	θ_j	D_j/D_B	M_∞	$R_N \times 10^{-6}$
4B	2.70	0	0.25	2.50	0.23
	2.70	0	0.25	2.50	0.47
	2.70	0	0.25	3.00	0.25
	2.70	0	0.25	3.00	0.51
4C	2.70	10	0.20	2.50	0.47
	2.70	10	0.20	3.00	0.51
4D	2.70	15	0.20	2.50	0.47
	2.70	15	0.20	3.00	0.51
4E	2.70	20	0.20	2.50	0.47
	2.70	20	0.20	3.00	0.54
	2.70	20	0.20	3.50	0.50
	2.70	20	0.20	4.00	0.50
	2.70	20	0.20	4.50	0.49
4F	2.70	20	0.30	2.50	0.54
	2.70	20	0.30	3.00	0.54
5A	3.20	0	0.20	2.50	0.23
	3.20	0	0.20	2.50	0.47
	3.20	0	0.20	3.00	0.25
	3.20	0	0.20	3.00	0.51
5B	3.20	0	0.31	2.50	0.23
	3.20	0	0.31	2.50	0.47
	3.20	0	0.31	3.00	0.25
	3.20	0	0.31	3.00	0.51
5C	3.20	20	0.20	2.50	0.47
	3.20	20	0.20	3.00	0.51
6A	3.80	20	0.20	3.00	0.50
	3.80	20	0.20	2.50	0.47

TABLE A-II. NOZZLE POSITION DATA

Group	M_j	θ_j	D_j/D_B	M_∞	R_N (in.)	X_N D_B
7A	2.70	20	0.10	2.50	$0.55 \times 10^{+6}$	-0.60
						-0.40
						0
						0.33
						0.50
						0.67
						0.82
						0.98
7B	2.70	20	0.20	2.50	$0.55 \times 10^{+6}$	-0.60
						-0.40
						-0.20
						0
						0.33
						0.50
						0.67
						0.82
						0.98
				3.50	$0.50 \times 10^{+6}$	-0.60
						-1.20
				4.50	$0.49 \times 10^{+6}$	-0.60
						-1.20
7C	2.70	20	0.30	2.50	$0.55 \times 10^{+6}$	-0.60
						-0.40
						-0.20
						0
						0.33
						0.50
						0.67
						0.82

TABLE A-III. REYNOLDS NUMBER DATA

Group	M_j	θ_j	D_j/D_B	M_∞	R_N (in.)
8A	2.70	0	0.25	2.50	$0.12 \times 10^{+6}$
					$0.23 \times 10^{+6}$
					$0.35 \times 10^{+6}$
					$0.47 \times 10^{+6}$
8B	1.00	0	0.056	2.50	$0.12 \times 10^{+6}$
					$0.23 \times 10^{+6}$
					$0.35 \times 10^{+6}$
					$0.47 \times 10^{+6}$

GROUP 1A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.25	.25	.10	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
1.15	.5416	-.1071	.0005*	-.001*	63.00
1.73	.5378	-.1080	.0010	.002	63.00
5.50	.4966	-.1176	.0040	.013	63.00
11.17	.4289	-.1335	.0090	.030	63.00
23.00	.4063	-.1387	.0190	.064	63.00
46.08	.2168	-.1831	.0380	.131	63.00
69.71	.2155	-.1828	.0580	.199	63.00
115.88	.2694	-.1702	.0970	.333	63.00
173.62	.3238	-.1587	.1460	.500	63.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.25	.25	.10	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3682	-.1011	.0001*	-.001*	60.00
1.81	.4178	-.0931	.0010	.002	60.00
9.14	.3571	-.1028	.0050	.016	60.00
18.05	.3503	-.1039	.0100	.034	60.00
35.94	.2450	-.1208	.0210	.070	60.00
72.53	.2141	-.1257	.0420	.144	60.00
107.43	.2403	-.1216	.0630	.214	60.00
180.33	.2955	-.1127	.1050	.361	60.00
255.85	.3503	-.1040	.1500	.513	60.00
144.55	.2706	-.1163	.0840	.289	60.00

GROUP 1B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.35	.35	.14	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	1.69	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4856	-.1175	.0004*	-.003*	60.00
.58	.5195	-.1098	.0005*	-.003*	60.00
1.17	.5496	-.1029	.0010	.002	60.00
1.76	.5390	-.1053	.0020	.005	60.00
2.94	.5034	-.1134	.0040	.012	60.00
5.86	.4278	-.1307	.0090	.029	60.00
11.74	.4160	-.1334	.0190	.062	60.00
17.60	.3393	-.1510	.0290	.096	60.00
20.65	.2839	-.1643	.0340	.114	60.00
23.54	.2257	-.1769	.0390	.130	60.00
29.39	.2089	-.1608	.0490	.164	60.00
40.68	.2399	-.1737	.0680	.229	60.00
58.31	.2822	-.1640	.0970	.330	60.00
84.99	.3289	-.1533	.1420	.483	60.00
88.39	.3359	-.1517	.1480	.503	60.00
103.10	.3585	-.1466	.1720	.587	60.00
117.99	.3801	-.1416	.1970	.673	60.00
147.32	.4225	-.1319	.2460	.841	60.00
176.80	.4553	-.1244	.2960	1.011	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.35	.35	.14	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	.85	1.40	15.0	.23

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4767	-.1195	.0004*	-.003*	60.00
117.29	.3729	-.1433	.1960	.669	60.00
175.88	.4434	-.1272	.2940	1.005	60.00
234.58	.5075	-.1125	.3930	1.343	60.00
293.05	.5610	-.1003	.4910	1.679	60.00
347.57	.6140	-.0882	.5820	1.992	60.00

GROUP 1B (Concluded)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.35	.35	.14	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	93.00	1.10	1.40	15.0	.51

PC/PF	PB/PF	CFB	RMF	CT	TC
.37	.3548	-.1023	.0002*	-.002*	60.00
.90	.4232	-.0915	.0010	0.000	60.00
1.81	.4056	-.0943	.0030	.005	60.00
2.71	.3852	-.0975	.0040	.011	60.00
4.53	.3525	-.1027	.0070	.021	60.00
8.90	.3480	-.1034	.0140	.046	60.00
17.93	.2400	-.1206	.0300	.098	60.00
22.45	.1826	-.1297	.0370	.124	60.00
27.02	.1865	-.1291	.0450	.150	60.00
36.07	.2068	-.1258	.0600	.202	60.00
45.09	.2248	-.1230	.0750	.254	60.00
62.32	.2557	-.1181	.1040	.353	60.00
90.37	.2994	-.1112	.1510	.514	60.00
135.16	.3545	-.1024	.2260	.772	60.00
180.70	.4053	-.0943	.3020	1.033	60.00
225.63	.4529	-.0868	.3780	1.291	60.00
271.02	.4930	-.0804	.4540	1.552	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.35	.35	.14	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	93.00	.55	1.40	15.0	.25

PC/PF	PB/PF	CPR	RMF	CT	TC
180.38	.4198	-.0920	.2090	.716	60.00
269.87	.4792	-.0826	.3140	1.073	60.00
360.28	.5593	-.0713	.4190	1.434	60.00
450.83	.6154	-.0610	.5240	1.795	60.00
540.97	.6771	-.0512	.6290	2.155	60.00

GROUP 1C

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.50	.50	.20	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.47

PC/PF	PB/PF	CPR	RMF	CT	TC
.49	.4883	-.1200	.0009*	-.006*	73.00
1.14	.5512	-.1055	.0030	.004	73.00
1.72	.5181	-.1130	.0050	.010	73.00
2.59	.4709	-.1240	.0080	.020	73.00
5.47	.4119	-.1379	.0180	.054	73.00
11.22	.2368	-.1789	.0370	.121	73.00
22.75	.2510	-.1711	.0760	.254	73.00
46.42	.3428	-.1502	.1560	.528	73.00
69.28	.4149	-.1337	.2340	.793	73.00
94.75	.4884	-.1169	.3[illegible]	1.089	73.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.50	.50	.20	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.51

PC/PF	PB/PF	CPR	RMF	CT	TC
1.79	.4083	-.0949	.0040	.008	68.00
9.04	.2467	-.1206	.0210	.066	68.00
17.81	.2099	-.1256	.0410	.137	68.00
35.51	.2745	-.1162	.0830	.279	68.00
72.53	.3784	-.0996	.1700	.577	68.00
108.70	.4592	-.0868	.2550	.868	68.00
165.36	.5705	-.0686	.3880	1.324	68.00

GROUP 2A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.35	.42	.16	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	93.00	1.69	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4927	-.1159	.0006*	-.004*	60.00
1.18	.5517	-.1026	.0016*	-.002*	60.00
2.94	.5034	-.1134	.0070	.012	60.00
5.92	.4257	-.1312	.0150	.030	60.00
11.81	.3518	-.1481	.0300	.067	60.00
17.69	.1736	-.1888	.0450	.104	60.00
23.59	.1724	-.1891	.0600	.142	60.00
29.52	.1853	-.1862	.0750	.179	60.00
40.68	.2132	-.1798	.1040	.249	60.00
58.90	.2397	-.1737	.1510	.364	60.00
88.36	.2728	-.1662	.2260	.549	60.00
117.67	.2991	-.1601	.3020	.734	60.00
147.32	.3234	-.1546	.3780	.920	60.00
176.83	.3464	-.1493	.4540	1.106	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.35	.42	.16	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	93.00	.85	1.40	15.0	.23

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4781	-.1192	.0006*	-.004*	60.00
117.64	.2936	-.1614	.3020	.733	60.00
176.48	.3332	-.1524	.4530	1.104	60.00
235.54	.3696	-.1440	.6040	1.475	60.00
294.04	.4012	-.1368	.7540	1.843	60.00
352.83	.4303	-.1301	.9050	2.213	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.35	.42	.16	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	1.10	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3543	-.1024	.0003*	-.003*	60.00
.90	.4256	-.0911	.0008*	-.002*	60.00
1.81	.4113	-.0934	.0017*	0.000*	60.00
4.52	.3194	-.1080	.0080	.015	60.00
8.90	.2988	-.1112	.0150	.034	60.00
17.95	.1456	-.1356	.0320	.073	60.00
26.99	.1593	-.1334	.0480	.113	60.00
36.03	.1704	-.1316	.0640	.152	60.00
45.10	.1793	-.1302	.0800	.192	60.00
62.39	.1951	-.1277	.1110	.268	60.00
90.30	.2329	-.1217	.1610	.390	60.00
135.15	.2651	-.1166	.2400	.586	60.00
180.34	.2940	-.1120	.3210	.783	60.00
225.59	.3216	-.1076	.4020	.981	60.00
271.23	.3489	-.1033	.4830	1.180	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.35	.42	.16	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	.55	1.40	15.0	.25

PC/PF	PB/PF	CPB	RMF	CT	TC
180.52	.2869	-.1131	.3210	.784	60.00
269.74	.3193	-.1080	.4800	1.174	60.00
360.39	.3525	-.1027	.6420	1.570	60.00
450.68	.3869	-.0973	.8030	1.964	60.00
540.92	.4250	-.0912	.9640	2.359	60.00

GROUP 2B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.42	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	1.69	1.40	15.0	.47
PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4787	-.1191	.0009*	-.006*	60.00
1.17	.5379	-.1056	.0023*	-.003*	60.00
2.95	.4662	-.1220	.0100	.017	60.00
5.68	.3658	-.1449	.0200	.041	60.00
11.64	.2238	-.1773	.0420	.094	60.00
17.55	.1828	-.1867	.0630	.147	60.00
23.39	.2033	-.1820	.0850	.199	60.00
29.38	.2253	-.1770	.1060	.252	60.00
58.75	.2865	-.1630	.2130	.514	60.00
88.27	.3298	-.1531	.3210	.778	60.00
117.81	.3643	-.1452	.4280	1.041	60.00
146.92	.3914	-.1391	.5340	1.301	60.00
150.08	.3947	-.1383	.5460	1.329	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.42	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	.85	1.40	15.0	.23
PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.4773	-.1194	.0010*	-.006*	60.00
117.66	.3490	-.1487	.4280	1.040	60.00
176.46	.3983	-.1375	.6420	1.564	60.00
235.72	.4389	-.1282	.8570	2.092	60.00
293.34	.4733	-.1203	1.0670	2.606	60.00
322.80	.4935	-.1164	1.1740	2.869	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.42	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	93.00	1.10	1.40	15.0	.51
PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3558	-.1022	.0005*	-.005*	60.00
.90	.4385	-.0891	.0012*	-.003*	60.00
4.52	.2850	-.1134	.0110	.021	60.00
9.01	.2288	-.1224	.0220	.049	60.00
18.03	.1645	-.1326	.0450	.105	60.00
27.05	.1818	-.1298	.0680	.161	60.00
45.22	.2068	-.1258	.1140	.273	60.00
62.45	.2439	-.1200	.1570	.380	60.00
90.45	.2754	-.1150	.2280	.553	60.00
134.95	.3125	-.1091	.3410	.829	60.00
180.50	.3433	-.1042	.4560	1.111	60.00
225.64	.3719	-.0996	.5700	1.391	60.00
263.15	.3969	-.0957	.6640	1.623	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	0.00	.42	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	93.00	.55	1.40	15.0	.25
PC/PF	PB/PF	CPB	RMF	CT	TC
180.18	.3251	-.1071	.4550	1.109	60.00
269.52	.3623	-.1012	.6810	1.662	60.00
360.23	.3991	-.0953	.9100	2.224	60.00
450.61	.4347	-.0897	1.1380	2.784	60.00
540.90	.4743	-.0834	1.3660	3.343	60.00

GROUP 2C

MJ	THFJ	D*	DJ	DJ/DB	XJ/DB
1.78	5.00	.42	.50	.20	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
[illegible]	.4872	-.1197	.0009*	-.006*	73.00
[illegible]	.5532	-.1044	.0022*	-.004*	73.00
5.57	.3877	-.1430	.0200	.040	73.00
11.40	.2338	-.1790	.0410	.092	73.00
23.17	.1856	-.1903	.0840	.197	73.00
46.58	.2436	-.1767	.1690	.406	73.00
92.99	.3254	-.1578	.3380	.820	73.00
119.02	.3573	-.1500	.4330	1.052	73.00

MJ	THFJ	D*	DJ	DJ/DB	XJ/DB
1.78	5.00	.42	.50	.20	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.37	.3689	-.1013	.0005*	-.005*	65.00
1.79	.4172	-.0935	.0024*	0.000*	65.00
8.39	.2614	-.1185	.0210	.045	65.00
17.45	.1600	-.1348	.0440	.101	65.00
35.41	.1948	-.1293	.0890	.212	65.00
72.32	.2430	-.1214	.1820	.441	65.00
144.38	.3366	-.1064	.3640	.887	65.00
221.08	.4009	-.0961	.5580	1.362	65.00

GROUP 2D

MJ	THFJ	D*	DJ	DJ/DB	XJ/DB
1.78	20.00	.20	.25	.10	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4843	-.1205	.0002*	-.001*	70.00
1.14	.5395	-.1077	.0005*	-.001*	70.00
1.74	.5360	-.1086	.0008*	0.000*	70.00
2.52	.5334	-.1092	.0012*	0.000*	70.00
5.39	.5097	-.1148	.0040	.009	70.00
11.27	.4474	-.1293	.0100	.022	70.00
22.93	.3805	-.1706	.0200	.048	70.00
46.27	.2355	-.1789	.0420	.100	70.00
69.14	.1541	-.1981	.0620	.151	70.00
115.78	.1875	-.1902	.1050	.255	70.00
172.42	.2201	-.1826	.1560	.382	70.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	20.00	.20	.25	.10	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.41	.3299	-.1008	.0001*	-.001*	65.00
1.91	.3825	-.0928	.0006*	0.000*	65.00
9.11	.3527	-.1038	.0050	.012	65.00
18.15	.3372	-.1061	.0110	.026	65.00
36.10	.2639	-.1178	.0220	.054	65.00
72.04	.1527	-.1357	.0450	.109	65.00
108.11	.1658	-.1337	.0680	.165	65.00
180.27	.2358	-.1272	.1130	.277	65.00
270.91	.2550	-.1192	.1710	.417	65.00

GROUP 2E

MJ	THFJ	D*	DJ	DJ/DB	XJ/DB
1.78	20.00	.42	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4875	-.1195	.0009*	-.006*	63.00
1.15	.5525	-.1044	.0023*	-.004*	63.00
5.35	.3333	-.1556	.0190	.038	63.00
11.34	.2919	-.1653	.0410	.092	63.00
22.65	.1947	-.1894	.0820	.192	63.00
46.34	.2548	-.1740	.1680	.404	63.00
69.44	.3019	-.1630	.2520	.610	63.00
139.99	.4202	-.1350	.5090	1.239	63.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.78	20.00	.42	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3679	-.1012	.0005*	-.005*	65.00
1.79	.4165	-.0934	.0024*	0.000*	65.00
8.33	.2964	-.1125	.0210	.045	65.00
17.94	.1946	-.1288	.0450	.104	65.00
35.81	.2066	-.1270	.0900	.215	65.00
108.57	.3176	-.1091	.2740	.666	65.00
180.75	.4132	-.0938	.4560	1.113	65.00
212.05	.4528	-.0875	.5350	1.306	65.00

GROUP 2F

MJ	THFJ	D*	DJ	DJ/DB	XJ/DB
1.78	20.00	.63	.75	.30	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.4888	-.1192	.0022*	-.015*	70.00
1.15	.5516	-.1046	.0051*	-.009*	70.00
2.44	.4513	-.1281	.0110*	.003*	70.00
5.50	.3038	-.1626	.0450	.089	70.00
11.35	.2064	-.1853	.0920	.207	70.00
23.26	.2767	-.1690	.1900	.446	70.00
46.40	.3751	-.1458	.3790	.910	70.00
69.20	.4507	-.1282	.5660	1.367	70.00

MJ	THFJ	D*	DJ	DJ/DB	XJ/DB
1.78	20.00	.63	.75	.30	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.39	.3689	-.1013	.0012*	-.011*	67.00
1.78	.3992	-.0964	.0055*	-.002*	67.00
8.53	.1731	-.1327	.0480	.104	67.00
17.71	.2239	-.1246	.1000	.232	67.00
35.87	.2941	-.1133	.2030	.485	67.00
72.79	.3971	-.0966	.4130	.999	67.00
111.40	.5035	-.0793	.6330	1.537	67.00

GROUP 3A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.20	0.00	.35	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	93.00	1.69	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4797	-.1189	.0009*	-.006*	60.00
1.18	.5433	-.1043	.0023*	-.003*	60.00
2.95	.4934	-.1164	.0059*	.003*	60.00
5.93	.4102	-.1347	.0170	.030	60.00
11.81	.2546	-.1703	.0340	.069	60.00
17.73	.1553	-.1930	.0510	.108	50.00
23.62	.1656	-.1907	.0680	.147	60.00
29.62	.1763	-.1882	.0850	.187	60.00
59.37	.2264	-.1768	.1710	.383	60.00
88.47	.2504	-.1713	.2560	.579	60.00
118.08	.2697	-.1659	.3420	.776	60.00
147.12	.2845	-.1635	.4260	.969	60.00
176.94	.2984	-.1603	.5120	1.167	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.20	0.00	.35	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	1.10	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3541	-.1025	.0005*	-.005*	60.00
.90	.4337	-.0898	.0012*	-.003*	60.00
1.81	.4108	-.0935	.0025*	0.000*	60.00
4.53	.3046	-.1103	.0090	.014	60.00
8.86	.2218	-.1235	.0170	.034	60.00
17.93	.1389	-.1366	.0360	.076	60.00
27.01	.1503	-.1348	.0540	.118	60.00
36.08	.1571	-.1337	.0720	.160	60.00
45.11	.1633	-.1327	.0900	.201	60.00
62.38	.1794	-.1302	.1250	.281	60.00
90.44	.2014	-.1267	.1810	.411	60.00
135.20	.2210	-.1236	.2710	.617	60.00
179.92	.2398	-.1206	.3610	.824	60.00
225.44	.2570	-.1179	.4530	1.034	60.00
273.63	.2757	-.1149	.5500	1.257	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.20	0.00	.35	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	93.00	.85	1.40	15.0	.23

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4766	-.1196	.0009*	-.006*	60.00
117.89	.2596	-.1692	.3410	.774	60.00
176.44	.2871	-.1629	.5110	1.164	60.00
236.08	.3108	-.1575	.6830	1.560	60.00
293.96	.3277	-.1536	.8510	1.945	60.00
348.13	.3450	-.1496	1.0080	2.305	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.20	0.00	.35	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	.55	1.40	15.0	.25

PC/PF	PB/PF	CPB	RMF	CT	TC
180.43	.2377	-.1209	.3620	.826	60.00
270.58	.2581	-.1177	.5440	1.243	60.00
361.14	.2793	-.1143	.7260	1.661	60.00
451.39	.3003	-.1110	.9080	2.077	60.00
541.84	.3253	-.1070	1.0900	2.495	60.00

GROUP 3B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.20	20.00	.16	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	108.00	1.69	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
11.83	.2667	-.1676	.0340	.069	70.00
17.81	.1589	-.1922	.0510	.109	70.00
23.79	.1559	-.1929	.0680	.149	70.00
44.59	.1925	-.1845	.1290	.287	70.00
59.35	.2146	-.1795	.1710	.385	70.00
88.76	.2512	-.1711	.2570	.581	70.00
118.60	.2877	-.1627	.3430	.779	70.00
148.34	.3152	-.1565	.4290	.977	70.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.20	20.00	.16	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	96.00	1.10	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
1.81	.4109	-.0934	.0025*	0.000*	70.00
4.54	.3198	-.1079	.0090	.014	70.00
18.09	.1346	-.1373	.0360	.077	70.00
27.29	.1520	-.1345	.0540	.119	70.00
36.39	.1669	-.1323	.0730	.161	70.00
68.29	.2049	-.1263	.1370	.308	70.00
91.09	.2231	-.1233	.1830	.414	70.00
136.40	.2562	-.1180	.2740	.623	70.00
181.40	.3004	-.1110	.3640	.831	70.00
227.19	.3363	-.1053	.4570	1.042	70.00

GROUP 4A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.28	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	1.69	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4864	-.1173	.0009*	-.006*	60.00
.59	.5080	-.1124	.0011*	-.006*	60.00
1.18	.5559	-.1014	.0023*	-.003*	60.00
1.77	.5472	-.1034	.0035*	-.001*	60.00
2.94	.5301	-.1073	.0058*	.003*	60.00
5.85	.4581	-.1238	.0117*	.016*	60.00
11.77	.3933	-.1386	.0230	.042	60.00
14.73	.3483	-.1489	.0290	.055	60.00
17.68	.1507	-.1941	.0350	.068	60.00
20.66	.1435	-.1957	.0410	.081	60.00
23.58	.1462	-.1951	.0470	.094	60.00
29.46	.1533	-.1935	.0590	.120	60.00
40.70	.1711	-.1894	.0810	.169	60.00
58.95	.1843	-.1864	.1180	.250	60.00
88.32	.1974	-.1834	.1760	.379	60.00
117.86	.2080	-.1810	.2360	.509	60.00
147.30	.2158	-.1792	.2950	.639	60.00
176.48	.2222	-.1777	.3530	.767	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.28	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	.85	1.40	15.0	.23

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4743	-.1201	.0009*	-.006*	60.00
117.52	.2034	-.1820	.2350	.500	60.00
176.22	.2178	-.1787	.3530	.766	60.00
235.27	.2304	-.1758	.4710	1.026	60.00
293.67	.2403	-.1737	.5880	1.283	60.00
352.49	.2472	-.1720	.7060	1.541	60.00

GROUP 4A (Concluded)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	1.10	1.40	15.0	.51

PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3544	-.1024	.0005*	-.005*	60.00
.90	.4293	-.0905	.0012*	-.003*	60.00
4.53	.3457	-.1038	.0062	.007*	60.00
8.94	.2335	-.1221	.0120	.020	60.00
17.99	.1226	-.1392	.0250	.048	60.00
27.03	.1275	-.1384	.0370	.076	60.00
45.54	.1353	-.1372	.0630	.132	60.00
62.40	.1502	-.1348	.0860	.184	60.00
90.49	.1559	-.1339	.1250	.270	60.00
135.09	.1661	-.1323	.1870	.406	60.00
180.44	.1758	-.1308	.2510	.545	60.00
225.76	.1846	-.1294	.3140	.683	60.00
270.93	.1934	-.1280	.3770	.821	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	.55	1.40	15.0	.25

PC/PF	PB/PF	CPB	RMF	CT	TC
180.74	.1873	-.1289	.2510	.545	60.00
270.05	.1961	-.1275	.3750	.818	60.00
360.09	.2062	-.1259	.5010	1.094	60.00
450.25	.2157	-.1244	.6260	1.369	60.00
540.90	.2249	-.1230	.7520	1.646	60.00

GROUP 4B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.35	.62	.25	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	93.00	1.69	1.40	15.0	.23

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4782	-.1192	.0015*	-.011*	60.00
1.18	.5554	-.1016	.0037*	-.006*	60.00
2.94	.4973	-.1148	.0093*	.006*	60.00
5.89	.4021	-.1366	.0186*	.026*	60.00
11.79	.1452	-.1953	.0370	.067	60.00
17.70	.1438	-.1956	.0560	.108	60.00
23.60	.1541	-.1933	.0740	.149	60.00
29.50	.1660	-.1906	.0930	.190	60.00
58.94	.1957	-.1838	.1860	.395	60.00
88.39	.2136	-.1804	.2800	.600	60.00
118.08	.2212	-.1780	.3740	.807	60.00
147.35	.2301	-.1759	.4660	1.010	60.00
154.19	.2329	-.1753	.4880	1.058	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.35	.62	.25	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	93.00	.85	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.4741	-.1201	.0015*	-.010*	60.00
116.88	.2136	-.1797	.3700	.798	60.00
175.99	.2290	-.1762	.5570	1.210	60.00
235.07	.2407	-.1735	.7440	1.621	60.00
293.34	.2519	-.1709	.9290	2.026	60.00
147.13	.2619	[illegible]	1.0990	2.401	60.00

GROUP 4B (Concluded)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.35	.62	.25	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	1.10	1.40	15.0	.25
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.38	.3548	-.1024	.0008*	-.008*	60.00
.90	.4432	-.0883	.0019*	-.005*	60.00
4.52	.2974	-.1115	.0099*	.011*	60.00
8.94	.1196	-.1397	.0190	.033	60.00
17.99	.1270	-.1385	.0390	.076	60.00
27.03	.1327	-.1376	.0590	.120	60.00
36.09	.1371	-.1369	.0790	.164	60.00
45.24	.1435	-.1359	.0990	.208	60.00
62.33	.1580	-.1336	.1370	.291	60.00
90.41	.1636	-.1327	.1980	.426	60.00
135.21	.1739	-.1311	.2970	.643	60.00
180.42	.1840	-.1295	.3970	.861	60.00
225.96	.1937	-.1279	.4970	1.081	60.00
271.10	.2078	-.1257	.5960	1.300	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.35	.62	.25	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	.55	1.40	15.0	.51
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
180.14	.1966	-.1275	.3960	.860	60.00
270.43	.2105	-.1253	.5950	1.296	60.00
360.09	.2223	-.1234	.7920	1.730	60.00
449.74	.2327	-.1217	.9890	2.163	60.00
541.83	.2443	-.1199	1.1920	2.608	60.00

GROUP 4C

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	10.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	100.00	1.73	1.40	15.0	.47
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.49	.4897	-.1192	.0009*	-.006*	63.00
1.16	.5468	-.1058	.0023*	-.004*	63.00
5.49	.4706	-.1236	.0110*	.015*	63.00
11.29	.4009	-.1399	.0220	.040	63.00
23.12	.1360	-.2017	.0460	.092	63.00
69.88	.1727	-.1929	.1400	.298	63.00
116.87	.2126	-.1833	.2340	.505	63.00
162.33	.2388	-.1777	.3250	.705	63.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	10.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	99.00	1.10	1.40	15.0	.51
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
1.81	.4142	-.0929	.0025*	0.000*	70.00
4.54	.3467	-.1036	.0063*	.007*	70.00
17.95	.1158	-.1403	.0240	.048	70.00
27.11	.1291	-.1382	.0370	.076	70.00
36.17	.1383	-.1367	.0500	.104	70.00
68.11	.1617	-.1330	.0940	.201	70.00
90.86	.1673	-.1321	.1260	.271	70.00
135.63	.1865	-.1291	.1880	.408	70.00
181.08	.2066	-.1259	.2520	.547	70.00
226.59	.2215	-.1235	.3150	.686	70.00

GROUP 4D

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	15.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	110.00	1.69	1.40	15.0	.47
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
1.19	.5496	-.1029	.0023*	-.003*	75.00
2.97	.5259	-.1083	.0059*	.003*	75.00
11.78	.3765	-.1425	.0230	.042	75.00
20.71	.1181	-.2015	.0410	.081	75.00
23.69	.1224	-.2005	.0470	.095	75.00
44.44	.1434	-.1957	.0890	.186	75.00
59.37	.1509	-.1940	.1180	.252	75.00
88.82	.1753	-.1884	.1770	.381	75.00
103.69	.1868	-.1858	.2070	.447	75.00
118.47	.1949	-.1840	.2370	.512	75.00
148.05	.2115	-.1802	.2960	.642	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	15.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	100.00	1.10	1.40	15.0	.51
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.90	.4261	-.0910	.0012*	-.003*	70.00
1.81	.4148	-.0928	.0025*	0.000*	70.00
4.54	.3541	-.1025	.0063*	.007*	70.00
8.91	.2435	-.1200	.0120	.020	70.00
18.06	.1076	-.1416	.0250	.048	70.00
27.11	.1188	-.1398	.0370	.076	70.00
36.25	.1292	-.1382	.0500	.104	70.00
45.45	.1380	-.1368	.0630	.132	70.00
68.12	.1545	-.1342	.0940	.201	70.00
91.05	.1606	-.1332	.1260	.271	70.00
135.97	.1731	-.1312	.1890	.409	70.00
158.61	.1839	-.1295	.2200	.478	70.00
181.55	.1937	-.1279	.2520	.548	70.00
226.96	.2096	-.1254	.3150	.687	70.00
266.57	.2231	-.1233	.3700	.808	70.00

GROUP 4E

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	100.00	1.73	1.40	15.0	.47
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.49	.4877	-.1196	.0009*	-.006*	68.00
.80	.5406	-.1072	.0016*	-.005*	68.00
1.63	.5417	-.1069	.0032*	-.001*	68.00
2.06	.5375	-.1079	.0041*	0.000*	68.00
5.20	.4779	-.1218	.0104*	.013*	68.00
11.24	.3942	-.1410	.0220	.040	68.00
18.20	.1913	-.1885	.0360	.070	68.00
22.33	.1311	-.2025	.0440	.089	68.00
33.77	.1442	-.1995	.0670	.139	68.00
34.93	.1424	-.1999	.0700	.144	68.00
57.39	.1591	-.1964	.1150	.243	68.00
65.76	.1646	-.1947	.1310	.280	68.00
114.37	.2091	-.1843	.2290	.494	68.00
162.91	.2408	-.1775	.3260	.707	68.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	1.10	1.40	15.0	.54
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.41	.3738	-.0993	.0005*	-.005*	70.00
.95	.4177	-.0924	.0013*	-.003*	70.00
4.78	.3492	-.1032	.0066*	.008*	70.00
5.85	.3231	-.1074	.0081*	.011*	70.00
15.00	.1569	-.1338	.0200	.039	70.00
24.16	.1227	-.1392	.0330	.067	70.00
28.62	.1285	-.1383	.0390	.081	70.00
33.29	.1340	-.1374	.0460	.095	70.00
42.41	.1442	-.1358	.0590	.123	70.00
65.10	.1639	-.1327	.0900	.192	70.00
87.93	.1741	-.1310	.1220	.262	70.00
128.84	.1908	-.1284	.1790	.387	70.00
159.32	.2049	-.1261	.2210	.480	70.00
181.88	.2164	-.1243	.2530	.549	70.00
227.67	.2385	-.1208	.3160	.689	70.00
269.91	.2562	-.1180	.3750	.818	70.00

GROUP 4E (Concluded)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.50	0.00	.69	1.40	15.0	.50
PC/PF	**PB/PF**	**CPR**	**RMF**	**CT**	**TC**
.60	.2831	-.0836	.0006*	-.003*	-
.60	.2795	-.0840	.0006*	-.003*	-
.62	.2821	-.0837	.0006*	-.003*	-
1.47	.3475	-.0760	.0015*	-.001*	-
2.88	.3311	-.0780	.0029*	.001*	-
4.30	.2865	-.0832	.0043*	.004*	-
5.78	.2317	-.0895	.0050	.008	-
7.12	.1811	-.0954	.0070	.011	-
8.64	.1717	-.0965	.0080	.014	-
10.00	.1717	-.0965	.0100	.017	-
11.52	.1639	-.0975	.0110	.021	-
14.22	.1409	-.1002	.0140	.027	-
16.13	.1228	-.1022	.0160	.031	-
17.21	.1169	-.1029	.0170	.033	-
21.54	.1169	-.1029	.0220	.043	-
28.81	.1253	-.1020	.0290	.060	-
57.53	.1529	-.0987	.0580	.124	-
86.34	.1769	-.0959	.0880	.189	-
115.19	.1856	-.0949	.1170	.253	-
230.31	.2266	-.0901	.2350	.512	-
316.85	.2515	-.0872	.3230	.706	-
432.17	.2891	-.0829	.4410	.965	-

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
4.00	95.00	.44	1.40	15.0	.50
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
2.26	.2142	-.0701	.0017*	0.000*	60.00
4.53	.1780	-.0733	.0030	.004	60.00
6.80	.1512	-.0757	.0050	.008	60.00
11.31	.1335	-.0773	.0080	.015	60.00
22.35	.1316	-.0775	.0170	.034	60.00
33.57	.1470	-.0761	.0260	.054	60.00
66.86	.1843	-.0728	.0520	.111	60.00
89.63	.1991	-.0715	.0700	.150	60.00
160.69	.2391	-.0679	.1250	.272	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
4.50	0.00	.28	1.40	15.0	.49
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
1.23	.2093	-.0557	.0007*	-.001*	-
3.60	.2008	-.0563	.0022*	.002*	-
7.12	.1694	-.0585	.0040	.006	-
10.70	.1414	-.0605	.0060	.011	-
14.25	.1353	-.0610	.0080	.016	-
17.83	.1556	-.0595	.0110	.021	-
24.96	.1529	-.0597	.0150	.031	-
32.14	.1653	-.0588	.0190	.040	-
39.18	.1681	-.0586	.0240	.050	-
53.59	.1835	-.0576	.0330	.069	-
71.61	.1954	-.0567	.0440	.094	-
142.85	.2478	-.0530	.0880	.191	-
214.49	.2694	-.0515	.1320	.288	-
286.05	.3031	-.0491	.1760	.385	-
574.09	.3345	-.0469	.3550	.776	-
788.54	.3779	-.0438	.4870	1.068	-
1074.88	.4192	-.0409	.6640	1.457	-

GROUP 4F

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	100.00	1.73	1.40	15.0	.48
PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.4868	-.1200	.0022*	-.015*	67.00
1.16	.5533	-.1044	.0052*	-.009*	67.00
2.55	.5058	-.1155	.0114*	.004*	67.00
5.31	.4046	-.1392	.0239*	.032*	67.00
11.30	.1291	-.2036	.0500	.091	67.00
22.78	.1613	-.1958	.1020	.205	67.00
70.09	.2374	-.1779	.3160	.673	67.00
115.35	.3059	-.1620	.5200	1.121	67.00
138.89	.3310	-.1559	.6260	1.354	67.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	100.00	1.11	1.40	15.0	.54
PC/PF	PB/PF	CPB	RMF	CT	TC
.39	.3674	-.1015	.0012*	-.011*	65.00
1.80	.4170	-.0935	.0056*	-.001*	65.00
7.14	.1043	-.1340	.0220	.034	65.00
16.14	.1468	-.1369	.0500	.096	65.00
34.36	.1848	-.1307	.1070	.221	65.00
71.33	.2226	-.1243	.2230	.476	65.00
34.66	.1869	-.1303	.1080	.224	65.00
16.05	.1214	-.1407	.0500	.096	65.00
144.87	.2956	-.1126	.4530	.981	65.00
180.74	.3266	-.1079	.5650	1.228	65.00
.56	.5155	-.1107	.0017*	-.010*	65.00
218.30	.3550	-.1034	.6830	1.486	65.00

GROUP 5A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.22	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	1.69	1.40	15.0	.47
PC/PF	PB/PF	CPB	RMF	CT	TC
.48	.4790	-.1190	.0009*	-.007*	60.00
1.18	.5311	-.1071	.0023*	-.003*	60.00
2.95	.5313	-.1071	.0059*	.003*	60.00
5.91	.4852	-.1176	.0118*	.016*	60.00
11.85	.4120	-.1343	.0237*	.043*	60.00
17.74	.3851	-.1405	.0355*	.068*	60.00
23.62	.3500	-.1485	.0310	.057	60.00
29.55	.1562	-.1928	.0390	.074	60.00
58.97	.1570	-.1926	.0780	.158	60.00
88.44	.1632	-.1912	.1170	.241	60.00
117.90	.1701	-.1896	.1560	.325	60.00
147.34	.1772	-.1880	.1950	.408	60.00
176.70	.1831	-.1867	.2340	.492	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.22	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	.85	1.40	15.0	.23
PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4761	-.1197	.0009*	-.006*	60.00
117.84	.1722	-.1892	.1560	.325	60.00
176.17	.1791	-.1876	.2330	.490	60.00
235.03	.1860	-.1860	.3110	.657	60.00
293.47	.1916	-.1847	.3890	.823	60.00
352.74	.1973	-.1834	.4670	.991	60.00

GROUP 5A (Concluded)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.22	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	93.00	1.10	1.40	15.0	.51
PC/PF	PB/PF	CPB	RMF	CT	TC
.38	.3552	-.1023	.0005*	-.005*	60.00
.90	.4145	-.0929	.0012*	-.003*	60.00
4.52	.3811	-.0982	.0062*	.007*	60.00
9.01	.3005	-.1110	.0125*	.021*	60.00
18.02	.1247	-.1389	.0160	.029	60.00
27.11	.1108	-.1411	.0240	.047	60.00
4[illegible].30	.1202	-.1396	.0410	.082	60.00
62.45	.1250	-.1388	.0570	.116	60.00
90.59	.1286	-.1383	.0830	.172	60.00
135.30	.1339	-.1374	.1240	.260	60.00
180.58	.1405	-.1364	.1660	.349	60.00
225.68	.1471	-.1353	.2070	.438	60.00
271.03	.1535	-.1343	.2490	.527	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.22	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	93.00	.55	1.40	15.0	.25
PC/PF	PB/PF	CPB	RMF	CT	TC
178.60	.1563	-.1339	.1640	.345	60.00
270.45	.1623	-.1329	.2480	.526	60.00
360.43	.1690	-.1318	.3310	.703	60.00
451.45	.1762	-.1307	.4150	.882	60.00
542.05	.1813	-.1299	.4990	1.061	60.00

GROUP 5B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.35	.79	.31	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	.85	1.40	15.0	.23
PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.4749	-.1200	.0025*	-.017*	60.00
117.49	.1846	-.1863	.3970	.827	60.00
175.73	.1936	-.1849	.5940	1.248	60.00
234.21	.1977	-.1833	.7920	1.671	60.00
292.94	.2062	-.1814	.9910	2.096	60.00
318.66	.2098	-.1806	1.0780	2.283	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.35	.79	.31	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	93.00	1.69	1.40	15.0	.47
PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4780	-.1193	.0025*	-.017*	60.00
1.18	.5144	-.1018	.0060*	-.010*	60.00
2.95	.5234	-.1089	.0150*	.009*	60.00
5.89	.4310	-.1300	.0301*	.042*	60.00
11.80	.3324	-.1525	.0603*	.109*	60.00
17.75	.1447	-.1954	.0600	.105	60.00
23.60	.1491	-.1944	.0790	.147	60.00
29.47	.1539	-.1922	.0990	.190	60.00
58.72	.1796	-.1875	.1980	.401	60.00
88.37	.1861	-.1860	.2980	.616	60.00
117.87	.1897	-.1851	.3980	.829	60.00
147.15	.1929	-.1844	.4970	1.041	60.00
176.49	.1970	-.1835	.5970	1.254	60.00

GROUP 5B (Concluded)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.35	.79	.31	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	1.10	1.40	15.0	.51
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.39	.3536	-.1025	.0013*	-.013*	60.00
.90	.4412	-.0886	.0031*	-.009*	60.00
4.53	.333[illegible]	-.1058	.0160*	.019*	60.00
9.00	.1517	-.1346	.0210	.029	60.00
18.04	.1242	-.1390	.0420	.074	60.00
27.09	.1253	-.1388	.0630	.119	60.00
45.25	.1291	-.1382	.1060	.211	60.00
62.49	.1387	-.1367	.1460	.297	60.00
90.58	.1400	-.1364	.2120	.439	60.00
135.27	.1459	-.1355	.3170	.663	60.00
180.40	.1532	-.1344	.4230	.890	60.00
226.05	.1600	-.1333	.5310	1.120	60.00
270.94	.1669	-.1322	.6360	1.345	60.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	0.00	.35	.79	.31	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	93.00	.55	1.40	15.0	.25
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
180.78	.1776	-.1305	.4240	.842	60.00
270.10	.1882	-.1288	.6340	1.341	60.00
360.81	.1974	-.1273	.8470	1.797	60.00
451.57	.2049	-.1261	1.0600	2.253	60.00
541.52	.2123	-.1250	1.2720	2.705	60.00

GROUP 5C

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	20.00	.22	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	108.00	1.69	1.40	15.0	.47
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
11.91	.4194	-.1326	.0238*	.043*	70.00
17.85	.3747	-.1429	.0357*	.069*	70.00
23.80	.2884	-.1626	.0310	.058	70.00
44.57	.1277	-.1993	.0590	.117	70.00
59.43	.1366	-.1973	.0780	.159	70.00
89.10	.1443	-.1955	.1180	.243	70.00
118.64	.1620	-.1915	.1570	.327	70.00
148.26	.1768	-.1881	.1960	.411	70.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.20	20.00	.22	.50	.20	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
3.00	97.00	1.10	1.40	15.0	.51
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
1.81	.4108	-.0935	.0025*	0.000*	70.00
4.55	.3865	-.0973	.0063*	.007*	70.00
18.17	.1209	-.1395	.0160	.029	70.00
27.27	.1048	-.1420	.0250	.047	70.00
36.44	.1132	-.1407	.0330	.065	70.00
68.39	.1355	-.1372	.0620	.128	70.00
91.13	.1457	-.1356	.0830	.173	70.00
136.42	.1488	-.1350	.1250	.262	70.00
181.71	.1645	-.1326	.1670	.351	70.00
227.02	.1799	-.1303	.2080	.440	0.00

GROUP 6A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.80	20.00	.35	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	108.00	1.69	1.40	15.0	.47
PC/PF	PB/PF	CPB	RMF	CT	TC
11.85	.4711	-.1208	.0237*	.043*	70.00
17.82	.4249	-.1314	.0357*	.069*	70.00
23.79	.3950	-.1382	.0476*	.095*	70.00
44.53	.1083	-.2038	.0350	.065	70.00
59.38	.1163	-.2019	.0470	.090	70.00
89.02	.1237	-.2002	.0700	.139	70.00
118.61	.1273	-.1994	.0940	.189	70.00
148.28	.1385	-.1968	.1180	.239	70.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
3.80	20.00	.35	.50	.20	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
3.00	95.00	1.10	1.40	15.0	.51
PC/PF	PB/PF	CPB	RMF	CT	TC
.91	.4057	-.0943	.0012*	-.003*	70.00
1.81	.4065	-.0942	.0025*	0.000*	70.00
4.54	.4015	-.0949	.0063*	.007*	70.00
9.12	.3644	-.1008	.0126*	.021*	70.00
18.21	.2721	-.1155	.0253*	.049*	70.00
27.33	.1189	-.1398	.0150	.025	70.00
31.84	.0975	-.1432	.0170	.030	70.00
36.79	.0966	-.1433	.0200	.036	70.00
45.20	.1028	-.1424	.0250	.046	70.00
45.57	.1015	-.1426	.0250	.046	70.00
68.40	.1124	-.1408	.0370	.073	70.00
91.21	.1216	-.1394	.0500	.099	70.00
136.63	.1304	-.1380	.0750	.152	70.00
159.38	.1289	-.1382	.0880	.178	70.00
181.61	.1294	-.1381	.1000	.204	70.00
227.48	.1397	-.1365	.1250	.258	70.00
272.80	.1485	-.1351	.1510	.310	70.00

GROUP 7A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.14	.25	.10	-0.60
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.55

PC/PF	PB/PF	CPB	RMF	CT	TC
.62	.5059	-.1117	.0003	-.002	75.00
2.02	.5147	-.1097	.0010	.000	75.00
20.68	.4187	-.1314	.0103	.021	75.00
51.66	.2970	-.1589	.0258	.0550	75.00
102.43	.3165	-.1545	.0512	.1104	75.00
81.61	.3056	-.1570	.0408	.087	75.00
102.45	.3164	-.1545	.0512	.110	75.00
112.32	.3216	-.1534	.0512	.110	75.00
153.24	.3386	-.1495	.0766	.121	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.14	[illegible]	[illegible]	[illegible]
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	[illegible]	[illegible]

PC/PF	PB/PF	CPB	RMF	CT	TC
.59	.5037	-.1122	.0003	[illegible]	[illegible]
2.00	.5207	-.1084	.0018	[illegible]	[illegible]
20.63	.4347	-.1278	.0103	[illegible]	[illegible]
30.73	.3788	-.1404	.0146	[illegible]	[illegible]
40.86	.2935	-.1597	.0204	[illegible]	[illegible]
51.63	.2169	-.1770	.0250	[illegible]	[illegible]
61.64	.2207	-.1767	.0300	[illegible]	[illegible]
81.65	.2314	-.1738	.0408	[illegible]	[illegible]
102.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
153.10	.2636	-.1665	.0767	[illegible]	[illegible]

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.14	.25	.10	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.55

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4973	-.1136	.0003	-.0017	75.00
.95	.5065	-.1116	.0005	-.001	75.00
5.07	.5193	-.1087	.0025	.003	75.00
2.01	.5197	-.1086	.0010	0.000	75.00
18.06	.4585	-.1224	.0090	.017	75.00
30.56	.4170	-.1318	.0153	0.031	75.00
51.27	.3166	-.1545	.0256	0.054	75.00
81.20	.1715	-.1873	.0406	.087	75.00
111.80	.1240	-.1980	.0559	.120	75.00
152.61	.1384	-.1948	.0763	.166	75.00
91.43	.1376	-.1950	.0457	.098	75.00
112.15	.1261	-.15[illegible]6	.0561	.121	75.00
112.37	.1265	-.1975	.0562	.121	75.00
153.22	.1420	-.1940	.0766	.166	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.14	[illegible]	[illegible]	[illegible]
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	[illegible]	[illegible]	[illegible]

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.5009	-.1128	[illegible]	[illegible]	[illegible]
2.00	.5219	-.1081	[illegible]	[illegible]	[illegible]
5.06	.5227	-.1079	[illegible]	[illegible]	[illegible]
20.48	.4552	[illegible]	[illegible]	[illegible]	[illegible]
51.50	.3928	-.1463	[illegible]	[illegible]	[illegible]
[illegible].43	.2562	-.1681	[illegible]	[illegible]	[illegible]
118.21	.2058	-.1799	[illegible]	[illegible]	[illegible]
152.71	.1720	-.1872	[illegible]	[illegible]	[illegible]

GROUP 7A (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.14	.25	.10	0.50
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.5023	-.1125	.0002	-.002	75.00
2.01	.5191	-.1087	.0010	.000	75.00
5.06	.5252	-.1073	.0025	.003	'5.00
20.44	.4573	-.1227	.0102	.020	75.00
51.12	.3421	-.1487	.0255	.054	75.00
81.11	.2686	-.1654	.0405	.087	75.00
111.71	.2473	-.1702	.0558	.121	75.00
152.52	.2309	-.1739	.0762	.165	75.00
117.89	.3281	-.1519	.0589	.127	75.00
132.26	.2670	-.1657	.0661	.143	75.00

MJ	THEJ	D*	DJ	[illegible]	[illegible]
2.70	20.00	.14	[illegible]	[illegible]	[illegible]
MF	TOF	PF	GJ	[illegible]	[illegible]
2.50	95.0	1.96	[illegible]	[illegible]	[illegible]
PC/PF	PB/PF	CPB	[illegible]	CT	[illegible]
.51	.4982	-.1139	[illegible]	[illegible]	[illegible]
5.06	.5180	-.1090	[illegible]	[illegible]	[illegible]
20.40	.4509	-.1241	[illegible]	[illegible]	[illegible]
68.26	.2713	-.1648	[illegible]	[illegible]	[illegible]
68.26	.2713	-.1648	[illegible]	[illegible]	[illegible]
81.01	.4118	-.1330	[illegible]	[illegible]	[illegible]
111.74	.2780	-.1630	[illegible]	[illegible]	[illegible]
132.26	.2806	-.1626	[illegible]	[illegible]	[illegible]
152.29	.2665	-.1658	[illegible]	[illegible]	[illegible]

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.14	.25	.10	0.82
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4994	-.1132	.0003	-.002	75.00
5.06	.5166	-.1093	.0025	.003	75.00
20.48	.4529	-.1237	.0102	.020	75.00
51.03	.3491	-.1471	.0255	.053	75.00
66.39	.4631	-.1214	.0332	0.071	75.00
74.92	.3592	-.1449	.0374	.087	75.00
81.18	.3378	-.1497	.0406	.087	75.00
111.77	.3104	-.1559	.0558	.120	75.00
132.45	.2925	-.1600	.0662	.143	75.00
152.64	.2729	-.1644	.0763	.166	75.00
76.37	.3573	-.1453	.0382	0.082	75.00
54.49	.3354	-.1503	.0272	.057	75.00

MJ	THEJ	D*	DJ	[illegible]	[illegible]
2.70	20.00	.14	[illegible]	[illegible]	[illegible]
MF	TOF	PF	GJ	[illegible]	[illegible]
2.50	95.0	1.96	[illegible]	[illegible]	[illegible]
PC/PF	PB/PF	CPB	[illegible]	[illegible]	[illegible]
20.70	.4351	-.1277	[illegible]	[illegible]	[illegible]
51.66	.4100	-.1334	[illegible]	[illegible]	[illegible]
66.92	.3399	-.1492	[illegible]	[illegible]	[illegible]
81.72	.3189	-.1540	[illegible]	[illegible]	[illegible]
132.81	.2788	-.1631	[illegible]	[illegible]	[illegible]
153.03	.2672	-.1657	.0769	[illegible]	[illegible]
41.60	.4582	-.1229	.0208	[illegible]	[illegible]
28.67	.4240	-.1302	[illegible]	[illegible]	[illegible]

GROUP 7B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.50	.20	-0.60
11	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55

PC/PF	PB/PF	CPB	RMF	CT	TC
.60	.5011	-.1095	.0012	-.007	75.00
1.00	.5206	-.1052	.0020	-.005	75.00
2.01	.5171	-.1059	.0040	.000	75.00
5.07	.4475	-.1212	.0101	.013	75.00
10.20	.3706	-.1381	.0204	.036	75.00
12.79	.3303	-.1469	.0256	.047	75.00
14.09	.3137	-.1506	.0282	.053	75.00
15.35	.3021	-.1531	.0307	.058	75.00
20.47	.2963	-.1544	.0410	.0810	75.00
30.60	.3140	-.1505	.0613	.126	75.00
17.00	.2935	-.1550	.0341	.066	75.00
51.22	.3455	-.1436	.1026	.216	75.00
81.31	.3813	-.1357	.1628	.349	75.00
112.61	.4080	-.1299	.2243	.4840	75.00
149.58	.4350	-.1240	.2996	.6490	75.00

MJ	THEJ	D*	DJ	DJ/DB	[illegible]
2.70	20.00	.28	.50	[illegible]	[illegible]
MF	TOF	PF	GJ	LENGTH	[illegible]
2.30	95.0	1.96	1.40	[illegible]	[illegible]

PC/PF	PB/PF	CPB	RMF	CT	TC
.58	.4996	-.1098	.0012	[illegible]	[illegible]
1.00	.5287	-.1034	.0020	[illegible]	[illegible]
2.01	.5189	-.1056	.0040	[illegible]	[illegible]
5.15	.4595	-.1186	.0103	[illegible]	[illegible]
10.21	.3665	-.1390	.0205	[illegible]	[illegible]
15.36	.2155	-.1721	.0308	[illegible]	[illegible]
20.50	.2241	-.1702	.0411	[illegible]	[illegible]
30.58	.2424	-.1662	.0613	[illegible]	[illegible]
51.30	.2687	-.1604	.1028	[illegible]	[illegible]
81.42	.3088	-.1516	.1631	[illegible]	[illegible]
112.51	.3356	-.1458	.2249	[illegible]	[illegible]

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	-0.20
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55

PC/PF	PB/PF	CPB	RMF	CT	TC
.53	.4991	-.1099	.0010	-.007	75.00
1.01	.5311	-.1029	.0020	.005	75.00
2.02	.5266	-.1039	.0040	-.000	75.00
2.81	.5140	-.1066	.0056	.003	75.00
5.22	.4697	-.1164	.0105	.014	75.00
50.53	.1990	-.1757	.1012	.213	75.00
80.01	.2378	-.1672	.1622	.347	75.00
111.92	.2654	-.1612	.2242	.483	75.00
149.26	.2950	-.1547	.2989	.648	75.00
20.43	.1548	-.1854	.0409	.081	75.00
31.46	.1747	-.1811	.0630	.129	75.00
40.63	.1863	-.1785	.0814	.170	75.00

MJ	THEJ	D*	DJ	DJ/DB	[illegible]
2.70	20.00	.28	.50	.20	[illegible]
MF	TOF	PF	GJ	LENGTH	[illegible]
2.50	95.0	1.96	1.40	15.0	[illegible]

PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4995	-.1098	.0010	-.007	[illegible]
1.03	.5332	-.1024	.0002	[illegible]	[illegible]
2.01	.5259	-.1040	.0040	-.0010	[illegible]
10.21	.4130	-.1288	.0204	[illegible]	[illegible]
5.06	.4736	-.1155	.0101	[illegible]	[illegible]
12.78	.3695	-.1339	.0256	.047	[illegible]
17.00	.2345	-.1680	.0340	[illegible]	[illegible]
20.48	.1696	-.1822	.0410	.0810	[illegible]
21.77	.1496	-.1866	[illegible]	[illegible]	[illegible]
25.45	.1211	-.1928	[illegible]	[illegible]	[illegible]
30.59	.1245	-.1919	.0612	[illegible]	[illegible]
51.18	.1555	-.1853	[illegible]	.2160	[illegible]
81.23	.1872	-.1783	[illegible]	[illegible]	[illegible]
111.73	.2130	-.1727	.2740	[illegible]	[illegible]
148.37	.2366	-.1675	.2972	[illegible]	[illegible]

GROUP [illegible]3 (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.33
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4994	-.1098	.0010	-.007	75.00
1.02	.5178	-.1036	.0020	-.0050	75.00
5.07	.4899	-.1119	.0101	.0131	75.00
20.49	.2320	-.1685	.0410	.081	75.00
30.59	.1903	-.1777	.0612	.126	75.00
51.18	.1206	-.1929	.1025	.216	75.00
81.21	.1337	-.1901	.1627	.349	75.00
111.91	.1745	-.1811	.2242	.483	75.00
148.61	.2240	-.1703	.2976	.645	75.00
81.26	.1369	-.1984	.1628	.348	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	[illegible]
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	[illegible]
PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4903	-.1118	.0010	-.007	[illegible]
1.01	.5203	-.1053	.0020	-.0050	[illegible]
5.06	.4762	-.1149	.0101	.013	[illegible]
20.46	.2277	-.1495	.0410	.081	[illegible]
30.59	.3126	-.1508	.0612	[illegible]	[illegible]
51.26	.1260	-.1918	.1026	[illegible]	[illegible]
81.30	.1966	-.1785	.1678	[illegible]	[illegible]
111.84	.2482	-.1649	.2240	[illegible]	[illegible]
148.66	.3188	-.1495	.2977	[illegible]	[illegible]
30.62	.3174	-.1498	.0611	[illegible]	[illegible]
20.48	.2304	-.1689	.0410	.081	[illegible]
25.41	.2957	-.1545	.0509	[illegible]	[illegible]
28.00	.3118	-.1510	.0560	.114	[illegible]
30.47	.3138	-.1506	.0610	.125	[illegible]
33.15	.2770	-.1586	.0654	[illegible]	[illegible]
35.[illegible]	.2613	-.1621	.0714	.1480	[illegible]
40.66	.2107	-.1732	.0814	.169	[illegible]

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.82
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.5006	-.1096	.0010	-.007	75.00
1.01	.5297	-.1032	.0020	-.005	75.00
5.07	.4916	-.1115	.0101	.013	75.00
20.46	.3243	-.1482	.0410	.081	75.00
30.57	.2739	-.1593	.0612	.125	75.00
51.03	.1664	-.1829	.1022	.215	75.00
81.22	.2467	-.1653	.1627	.348	75.00
111.81	.3261	-.1479	.2239	.483	75.00
149.74	.4264	-.1258	.3000	.650	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	[illegible]
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	[illegible]
PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4970	-.1104	.0010	-.007	[illegible]
1.01	.5240	-.1042	.0020	-.005	[illegible]
5.07	.4882	-.1123	.0101	.013	[illegible]
20.47	.3206	-.1491	.0410	.081	[illegible]
30.55	.2953	-.1546	.0611	.125	[illegible]
51.10	.2097	-.1734	.1024	.212	[illegible]
81.19	.3102	-.1514	.1626	[illegible]	[illegible]
111.87	.3992	-.1318	.2242	.4831	[illegible]

GROUP 7B (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	0.67
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.1995	-.1098	.0010	-.007	75.00
1.01	.5285	-.1035	.0020	-.005	75.00
5.07	.4874	-.1125	.0110	.013	75.00
20.49	.4219	-.1488	.0410	0.081	75.00
29.73	.2596	-.1625	.0595	.122	75.00
39.63	.2403	-.1667	.0763	.165	75.00
51.09	.1711	-.1819	.1023	.216	75.00
81.18	.2502	-.1645	.1626	.348	75.00
111.83	.3260	-.1479	.2240	.483	75.00
151.36	.4228	-.1266	.3032	.657	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	-.40
MF	TOF	PF	GJ	LENGTH	RN/IN
3.50	95.00	.69	1.40	15.0	.90
PC/PF	PB/PF	CPB	RMF	CT	TC
.69	.2865	-.0000	.0006	-.003	--
28.78	.2275	-.0901	.0290	.060	--
57.57	.2540	-.0870	.0580	.124	--
231.02	.3412	-.0768	.2350	.317	--
115.24	.2985	-.0818	.1170	.253	--
433.11	.4021	-.0697	.4410	.965	--
317.58	.3695	-.0852	.3230	.706	--

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	-1.20
MF	TOF	PF	GJ	LENGTH	RN/IN
3.50	95.00	.69	1.40	15.0	.50
PC/PF	PB/PF	CPB	RMF	CT	TC
28.67	.2926	-.0825	.0290	.060	--
57.42	.3430	-.0766	.0580	.124	--
86.43	.3722	-.0732	.0880	.189	--
114.96	.3953	-.0705	.1170	.253	--
230.28	.4580	-.0632	.2350	.512	--
316.72	.4863	-.066	.3230	.706	--
431.52	.5248	-.0554	.4410	.965	--

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	-.40
MF	TOF	PF	GJ	LENGTH	RN/IN
4.50	95.00	.28	1.40	15.0	.40
PC/PF	PB/PF	CPB	RMF	CT	TC
1.75	.1903	-.0571	.0006	-.001	--
71.24	.2579	-.0528	.0440	-.094	--
142.78	.2969	-.0496	.0880	-.191	--
285.88	.3357	-.0469	.1760	-.383	--

GROUP 7B (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.28	.50	.20	-1.20
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
4.50	95.00	.28	1.40	15.0	.49
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
1.30	.2150	-.0554	.0007	.001	--
71.45	.2487	-.0530	.0440	.094	--
143.00	.2898	-.0572	.0880	.191	--
285.99	.3824	-.0436	.1760	.383	--
142.82	.3020	-.0495	.0880	.191	--
572.57	.4374	-.0396	.3550	.774	--
787.43	.4773	-.0439	.4870	1.068	--
1073.95	.5239	-.0336	.6640	1.457	--

GROUP 7C

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	-0.60
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.56	1.40	15.0	.55
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
10.41	.3015	-.1415	.0469	.0824	75.00
20.69	.3429	-.1365	.0933	.1843	75.00
30.82	.3732	-.1302	.2333	.491	75.00
81.81	.4723	-.1097	.3688	.789	75.00
112.33	.5084	-.1022	.5064	1.091	75.00
135.63	.5335	-.0969	.6114	1.322	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	-0.40
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.54
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
10.53	.2288	-.1603	.0472	.084	75.00
20.68	.2674	-.1522	.0932	.184	75.00
30.81	.2954	-.1464	.1389	.284	75.00
7.94	.2550	-.1548	.0358	.058	75.00
51.86	.3397	-.1372	.2338	.493	75.00
81.76	.3996	-.1248	.3687	.789	75.00
112.37	.4421	-.1159	.5066	1.092	75.00
136.19	.4688	-.1104	.6140	1.327	75.00

GROUP 7C (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	-0.20
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
7.95	.2986	-.1457	.0159	-.0127	75.00
10.64	.1598	-.1746	.0213	.104	75.00
30.95	.2229	-.1615	.0619	.307	75.00
51.87	.2644	-.1529	.1037	.517	75.00
51.87	.2648	-.1528	.1037	.517	75.00
82.11	.3285	-.1395	.1642	.812	75.00
112.63	.3726	-.1304	.2253	1.124	75.00
136.95	.4028	-.1241	.2739	1.368	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	0.33
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.50	.4957	-.1048	.0023	-.016	75.00
1.05	.5403	-.0955	.0047	-.0102	75.00
7.84	.3649	-.1320	.0353	.057	75.00
10.42	.2445	-.1570	.0470	.082	75.00
12.99	.2161	-.1629	.0586	.108	75.00
15.44	.1817	-.1700	.0696	.132	75.00
15.46	.1825	-.1699	.0697	.133	75.00
18.51	.1629	-.1740	.0818	.159	75.00
20.72	.1962	-.1678	.0934	.185	75.00
30.84	.1231	-.1822	.1390	.285	75.00
24.96	.1094	-.1851	.1125	.226	75.00
52.33	.1771	-.1710	.2359	.498	75.00
76.45	.2365	-.1587	.3446	.736	75.00
112.31	.3249	-.1403	.5065	1.091	75.00
134.60	.3788	-.1291	.6067	1.312	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	-0.0[illegible]
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.51	.4974	-.1044	.0073	-.016	75.00
.99	.5484	-.0938	.0065	-.011	75.00
2.02	.5187	-.1000	.0091	-.00[illegible]	75.00
2.81	.4918	-.1056	.0126	.007	75.00
5.08	.4206	-.1204	.0279	.029	75.00
10.44	.1950	-.1673	.0471	.062	75.00
15.56	.1432	-.1780	.0701	.133	75.00
7.85	.3050	-.1444	.0354	.057	75.00
20.[illegible]1	.1576	-.1750	.0933	.184	75.00
12.99	.1342	-.1799	.0586	.108	75.00
30.83	.1815	-.1701	.1390	.285	75.00
51.11	.2322	-.1596	.2304	.485	75.00
81.78	.2801	-.1496	.3687	.789	75.00
112.39	.3174	-.1418	.5067	1.092	75.00
126.91	.3316	-.1389	.5721	1.235	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	0.90
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	**PB/PF**	**CPB**	**RMF**	**CT**	**TC**
.50	.4951	-.1049	.0022	-.015	75.00
1.04	.5404	-.0955	.0047	-.010	75.00
10.43	.2673	-.1523	.0470	.082	75.00
15.45	.2878	-.1480	.0696	.132	75.00
12.99	.3529	-.1345	.0586	.106	75.00
18.07	.2359	-.1588	.0814	.158	75.00
20.71	.1693	-.1726	.0933	.184	75.00
30.72	.1693	-.1726	.1385	.283	75.00
51.68	.2724	-.1512	.2330	.491	75.00
51.71	.2722	-.1512	.2331	.491	75.00
81.80	.4197	-.1206	.3646	.789	75.00
112.43	.5601	-.0914	.5068	1.092	75.00
136.60	.6475	-.0733	.6148	1.335	75.00

GROUP 7C (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	0.67
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
1.01	.5416	-.0953	.0046	-.0110	75.00
10.43	.3690	-.1311	.0469	.0830	75.00
13.03	.2683	-.1520	.0587	.108	75.00
7.85	.3414	-.1368	.0354	.057	75.00
15.42	.2966	-.1462	.0695	.132	75.00
18.16	.2648	-.1528	.0819	.1592	75.00
20.71	.1582	-.1749	.0934	.1844	75.00
30.79	.2194	-.1622	.1388	.284	75.00
51.88	.3385	-.1375	.2339	.493	75.00
81.77	.4803	-.1080	.3686	.789	75.00
112.41	.6430	-.0742	.5067	1.092	75.00
134.89	.7618	-.0495	.6081	1.315	75.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	20.00	.42	.75	.30	0.82
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.0	1.96	1.40	15.0	.55
PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4973	-.1045	.0073	-.016	75.00
1.01	.5453	-.0945	.0046	-.010	75.00
13.00	.2549	-.1548	.0586	.108	75.00
20.71	.1574	-.1751	.0934	.185	75.00
18.55	.1495	-.1767	.0836	.163	75.00
15.41	.2472	-.1564	.0695	.1320	75.00
10.43	.2817	-.1492	.0470	.082	75.00
30.84	.2125	-.1636	.1390	.285	75.00
30.78	.2137	-.1634	.1388	.284	75.00
51.51	.3189	-.1415	.2322	.489	75.00
81.50	.4806	-.1079	.3674	.7860	75.00
112.40	.6431	-.0742	.5067	1.092	75.00
127.16	.7234	-.0575	.5732	1.238	75.00

GROUP 8A

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.352	.628	.25	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	0.42	1.40	15.0	.12
PC/PF	PB/PF	CPB	RMF	CT	TC
.52	.4539	-.1248	.0016	-.011	65.00
18.92	.2017	-.1824	.0596	.117	65.00
35.42	.2158	-.1792	.1118	.231	65.00
35.62	.2147	-.1794	.1124	.233	65.00
59.24	.2245	-.1772	.1869	.396	65.00
82.73	.2251	-.1764	.2610	.559	65.00
118.06	.2383	-.1740	.3725	.804	65.00
118.23	.2378	-.1741	.3756	.805	65.00
177.58	.2418	-.1732	.5595	1.216	65.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.352	.628	.25	0.00
MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	0.85	1.40	15.0	.23
PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4762	-.1197	.0016	-.011	65.00
17.75	.1723	-.1891	.0560	.109	65.00
29.52	.1730	-.1899	.0931	.257	65.00
59.02	.1925	-.1845	.1862	.395	65.00
59.12	.1930	-.1844	.1865	.395	65.00
88.79	.2101	-.1805	.2801	.601	65.00
118.37	.2163	-.1791	.3735	.806	65.00
119.04	.2163	-.1791	.3756	.811	65.00
177.34	.2301	-.1759	.5595	1.217	65.00

GROUP 8A (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.70	0.00	.352	.628	.25	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	1.2.	1.40	15.0	.35

PC/PF	PB/PF	CPB	RMF	CT	TC
.50	.4819	-.1184	.0016	-.011	65.00
18.13	.1504	-.1941	.0572	.111	65.00
18.25	.1505	-.1941	.0576	.112	65.00
59.27	.1964	-.1836	.1870	.396	65.00
78.94	.2053	-.1816	.2491	.533	65.00
79.00	.2053	-.1816	.2491	.532	65.00
79.00	.2050	-.1816	.2493	.533	65.00
98.67	.2120	-.1801	.3113	.669	65.00
118.37	.2181	-.1787	.3735	.867	65.00
177.67	.2361	-.1745	.5606	1.308	65.0C

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
2.7[illegible]	0.00	.352	.628	.25	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	1.70	1.40	15.0	.4[illegible]

PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4806	-.1187	.0016	-.011	65.00
17.66	.1436	-.1957	.0557	.108	65.00
44.34	.1856	-.1861	.1400	.293	65.00
58.99	.1953	-.1839	.1859	.394	65.00
58.99	.1953	-.1839	.1861	.394	65.00
88.62	.2102	-.1805	.2796	.600	65.00
118.06	.2202	-.1782	.3725	.804	65.00
147.53	.2290	-.1762	.4655	1.018	65.00
176.92	.2370	-.1743	.5582	1.211	65.00

GROUP 8 B

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.14	.14	.056	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	0.85	1.40	15.0	.23

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	0.42	1.40	15.0	.12

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4765	-.1196	.0000	.000	65.00
17.76	.3365	-.1516	.0005	.001	65.00
29.51	.2302	-.1759	.0008	.002	65.00
59.00	.2911	-.1620	.0016	.004	65.00
59.18	.2909	-.1620	.0016	.004	65.00
88.69	.3401	-.1508	.0023	.006	65.00
118.21	.3831	-.1409	.0031	.008	65.00
118.97	.3830	-.1410	.0031	.008	65.00
177.39	.4592	-.1235	.0047	.0[illegible]	65.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.14	.14	.056	0.00

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	0.85	1.40	15.0	.23

MF	TOF	PF	GJ	LENGTH	RN/IN
2.50	95.00	0.42	1.40	15.0	.12

PC/PF	PB/PF	CPB	RMF	CT	TC
.49	.4765	-.1196	.0000	.000	65.00
17.76	.3365	-.1516	.0005	.001	65.00
29.51	.2302	-.1759	.0008	.002	65.00
59.00	.2911	-.1620	.0016	.004	65.00
59.18	.2909	-.1620	.0016	.004	65.00
88.69	.3401	-.1508	.0023	.006	65.00
118.21	.3831	-.1409	.0031	.008	65.00
1[illegible].99	[illegible]	-.1[illegible]	.008[illegible]	.00[illegible]	[illegible]

GROUP 9B (Continued)

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.14	.14	.056	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.00	1.27	1.40	15.0	.35

PC/PF	PB/PF	CPB	RMF	CT	TC
.51	.4840	-.1179	.0001	.0000	65.00
18.10	.3286	-.1534	.0005	.001	65.00
18.16	.3285	-.1534	.0005	.001	65.00
18.16	.3285	-.1534	.0005	.001	65.00
59.33	.2851	-.1633	.0016	.003	65.00
78.95	.3246	-.1543	.0021	.005	65.00
79.45	.3244	-.1544	.0021	.005	65.00
99.04	.3558	-.1472	.0026	.007	65.00
146.58	.4158	-.1335	.0036	.010	65.00
177.17	.4505	-.1255	.0047	.012	65.00

MJ	THEJ	D*	DJ	DJ/DB	XJ/DB
1.00	0.00	.14	.14	.056	0.00
MF	**TOF**	**PF**	**GJ**	**LENGTH**	**RN/IN**
2.50	95.00	1.70	1.40	15.0	.47

PC/PF	PB/PF	CPB	RMF	CT	TC
17.66	.3316	-.1527	.0005	.001	65.00
.48	.4809	-.1186	.0000	.001	65.00
44.25	.2522	-.1709	.0012	.	65.00
44.25	.2522	-.1709	.0012	.003	65.00
58.[illegible]	.2870	-.1629	.0016	.004	65.00
59.44	.2874	-.1628	.0016	.004	65.00
88.50	.3371	-.1515	.0023	.006	65.00
118.02	.3787	-.1419	.0031	.008	65.00

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13. ABSTRACT

Results of supersonic wind tunnel tests are presented which show the effects of varying nozzle geometry, location, and supply pressure on the base pressure of a cylindrical body at zero angle of attack. The purpose of the tests was to investigate the parametric influences in the regions where base pressure is near a minimum, which occurs in the lower range of thrust levels. A bibliography of related experimental results is also included.

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